MONTHLY WEATHER REVIEW.

VOL. XII. WASHINGTON CITY, MAY, 1884. No. 5.

INTRODUCTION.

This REVIEW contains a general summary of the meteorological conditions which prevailed over the United States during May, 1884, based upon the reports from the regular and voluntary observers of the Signal Service and from co-operating state weather services.

Descriptions of the storms which occurred over the north Atlantic ocean during the month are also given and their approximate paths shown on chart i.

The most noteworthy features of the month were the destructive frosts which occurred in the lake region, New England and the northern portion of the middle Atlantic states, from the 28th to 31st, during the prevalence of high area vii.; and the excessive precipitation in the western Gulf states and southern slope, which resulted in damaging freshets in those districts.

Of the atmospheric depressions occurring during May, that described under "areas of low barometer" as number i. was especially severe during its passage over the lakes and resulted in great damage to shipping interests.

The month was slightly warmer than the average on the Atlantic coast south of New England, in the eastern Gulf states, and over the northwestern portion of the United States; elsewhere the mean temperature was below the average, the departure being greatest in the southern slope.

In the preparation of this REVIEW the following data, received up to June 20th, 1884, have been used, viz.: the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and twenty-two Signal Service stations and fourteen Canadian stations, as telegraphed to this office; one hundred and fifty-nine monthly journals, and one hundred and fifty monthly means from the former, and fourteen monthly means from the latter; two hundred and sixty-six monthly registers from voluntary observers; forty-nine monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports, through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime Register;" monthly weather reports from the local weather services of Alabama, Georgia, Illinois, Louisiana, Ohio, and Tennessee, and of the Central Pacific railway company; trustworthy newspaper extracts; and special reports.

ATMOSPHERIC PRESSURE.

[*Expressed in inches and hundredths.*]

The distribution of mean atmospheric pressure for May, 1884, determined from the tri-daily telegraphic observations of the Signal Service, is shown by the isobarometric lines on chart ii.

The area of mean barometric minima for May occupies about the same position as that for the preceding month, viz.: the southern plateau, where a small area is enclosed by the isobar of 29.8, the isobar of 29.85 including nearly the entire district. The mean pressure for the month is greatest along the coast of southern California, and in the north Pacific coast region, and in the south Atlantic and east Gulf states, where the mean pressures exceed 30.0, the highest barometric means reported being 30.03 at Olympia, Washington Territory, and 30.02 at Cedar Keys, Florida, Atlanta and Augusta, Georgia.

The mean pressure for May compared with that for April is from .02 to .09 greater over the northern and middle plateau districts and north Pacific coast region; it is also greater in the Gulf states, Tennessee, the Ohio and Saint Lawrence valleys, and on the Atlantic coast, the increase being greatest in New England and Nova Scotia, where it varies from .10 to .15. A decrease occurs in the southern plateau, and over the northern part of the country from central Montana to Lake Huron, the deficiency being greatest from Lake Superior to eastern Montana, where it varies from .10 to .14.

DEPARTURES FROM THE NORMAL VALUES FOR THE MONTH.

Compared with the normal pressure for May an increase of from .05 to .07 is shown over the eastern Rocky mountain slope; an increase varying from .01 to .04 also occurs in the Missouri valley, southern California, and in the middle and southern plateau districts. In the north and middle Pacific coast regions, Minnesota, and in all districts east of the Mississippi river the mean pressure is below the normal, the deficiencies varying from .05 to .07 in the north Pacific coast region, and from .05 to .10 in the lake region and Atlantic coast districts.

BAROMETRIC RANGES.

The monthly barometric ranges were greatest in New England and the upper lake region, the largest being 1.04 at Eastport, Maine, .93 on the summit of Mount Washington, New Hampshire, and .90 at Grand Haven, Michigan and Portland, Maine; they were least in California, Arizona, and along the Gulf coast where they were generally less than .40, the smallest occurring at Los Angeles and San Diego, California, where they were .26 and .27 respectively.

BAROMETRIC RANGES.

The monthly barometric ranges were greatest in New England and the upper lake region, where they varied from .76 to 1.04, the greatest range occurring at Eastport, Maine; they were smallest in California and Arizona and along the Gulf coast, where they were from .26 to .48, the smallest being reported from Los Angeles, California.

In the several districts the ranges varied as follows:

New England.—From .76 at New Haven, Connecticut, to 1.04 at Eastport, Maine.

Middle Atlantic states.—From .59 at Lynchburg, Virginia, to .74 at Sandy Hook, New Jersey.

South Atlantic states.—From .43 at Atlanta, Georgia, to .61 at Kitty Hawk, North Carolina.

Florida peninsula.—From .32 at Key West to .38 at Cedar Keys.

East Gulf states.—From .33 at New Orleans, Louisiana, to .42 at Montgomery, Alabama.

West Gulf states.—From .36 at Shreveport, Louisiana, to .48 at Indianola, Texas.

Rio Grande valley.—From .43 at Brownsville, Texas, to .54 at Rio Grande City, Texas.

Tennessee.—From .44 at Chattanooga and Nashville, to .49 at Knoxville.

Ohio valley.—From .61 at Louisville, Kentucky, to .70 at Indianapolis, Indiana, and Columbus, Ohio.

Lower lake region.—From .65 at Buffalo, New York, to .79 at Detroit, Michigan, and Toledo, Ohio.

Upper lake region.—From .78 at Port Huron, Michigan, to .90 at Grand Haven, Michigan.

Extreme northwest.—From .61 at Bismarck, Dakota, to .73 at Saint Vincent, Minnesota.

Upper Mississippi valley.—From .55 at Cairo, Illinois, to .86 at Davenport, Iowa.

Missouri valley.—From .64 at Yankton, Dakota, to .72 at Fort Bennett, Dakota.

Northern slope.—From .57 at Helena, Montana, to .67 at North Platte, Nebraska.

Middle slope.—From .63 at Denver, Colorado, to .78 at Dodge City, Kansas.

Southern slope.—From .49 at Fort Stockton, Texas, to .59 at Fort Concho, Texas.

Southern plateau.—From .33 at Fort Apache, Arizona, to .59 at El Paso, Texas.

Middle plateau.— .52 at Salt Lake City, Utah.

Northern plateau.—From .56 at Dayton, Washington Territory, to .68 at Lewiston, Idaho.

North Pacific coast region.—From .49 at Fort Canby, Washington Territory, to .62 at Portland, Oregon.

Middle Pacific coast region.—From .31 at San Francisco, California, to .40 at Red Bluff, California.

South Pacific coast region.—From .26 at Los Angeles, California to .35 at Yuma, Arizona.

AREAS OF HIGH BAROMETER.

I.—During the 1st the barometer rose rapidly over the upper Mississippi and Missouri valleys, lake region, and south to the Gulf. The morning reports of the 2d showed this high area central in the Missouri valley; during the day it moved eastward, and on the morning of the 3d the barometer was highest on the middle Atlantic coast, and, though falling slowly from this date, it remained highest on the Atlantic coast until the 6th. The cold wave accompanying this high area reached the Missouri valley on the 1st, and on the 2d included the upper lake region and Lake Erie. The temperature fell from 10° to 18° in the Mississippi valley, from 10° to 20° in the upper lake region, and from 15° to 30° in the lower lake region. The cold wave reached the Atlantic coast on the 3d, causing a fall in temperature in the middle Atlantic states of 10° to 16°.

II.—This high area, advancing from the northwest, was central in the Missouri valley on the 10th, and then moved eastward, reaching the Atlantic coast on the 12th. It was accompanied by a slight fall in temperature in the Missouri valley on the 10th, over Lake Michigan and the lower lakes on the 11th, and in the middle and south Atlantic states on the 12th.

III.—This area of high barometer appeared north of Montana on the 12th and was central in Nebraska on the 13th. On the 14th the pressure increased over the lake region, the Ohio valley and Tennessee, and over the districts on the Atlantic coast. During the 12th the temperature fell 20° at Cheyenne, Wyoming, and 10° at Denver, Colorado, and at Omaha, Nebraska. During the 13th the cold wave moved eastward to Lake Erie and as far south as Tennessee, and on the 14th reached the middle and south Atlantic and eastern Gulf states.

IV.—The morning report of the 16th showed a rise of .10 to .30 over the upper lakes and Lake Erie. The temperature had fallen over the lake region and the Ohio valley. During the 16th the area of increased pressure moved east to and including the lower lakes and the Ohio valley, and on the 17th reached the Atlantic coast. The temperature fell slightly in New England on the 16th, and on the Atlantic coast during the night of the same day.

V.—This high area appeared in Montana on the morning of the 18th, a rise of .20 extending as far south as Colorado. By the morning of the 19th the rise had extended over Texas with the highest barometer at Fort Elliott. During the 19th the barometer rose over the lake region and thence southward over the eastern Gulf states. On the morning of the 21st, the barometer was highest on the middle Atlantic coast, and had risen from .20 to .40 over the lake region. This marked rise extended to the northeast during the day, and on the morning of the 22d, the barometer was highest in the Saint Lawrence valley, and comparatively high on the middle and south Atlantic coasts. By the morning of the 23d, the area of greatest pressure had moved over Nova Scotia. Accompanying the increased pressure, a cold wave appeared in Montana on the 18th. On the 19th it was over the upper Mississippi and Missouri valleys. On the morning of the 20th it was over Lake Michigan, the lower lakes, and the Ohio valley and Tennessee. No marked change in temperature was produced on the Atlantic coast.

VI.—The barometer rose on the Pacific coast during the 21st, and on the 22d the rise extended eastward to and including the Missouri valley and southward over the Gulf states. The pressure increased in the upper lake region and the Mississippi valley and thence westward to the Pacific coast on the 23d; and on the morning of the 24th this high area was central in Dakota. On the morning of the 25th the barometer was highest at Duluth, Minnesota. During the day the area of increased pressure moved eastward to New England and to Nova Scotia on the 26th. The temperature fell from 7° to 18° in the Missouri valley on the 22d, and from 4° to 15° in the Mississippi valley on the 23d. On the 24th the temperature fell from 3° to 12° in the upper lake region and from 5° to 13° in the lower lake region, and slightly in the Ohio valley and Tennessee. During the 25th the cold wave extended eastward to the Atlantic coast, the temperature falling from 6° to 12° in the middle Atlantic states and from 6° to 21° in New England.

VII.—The midnight report of the 26th showed a slight rise over Lake Superior; during the 27th the pressure increased rapidly over the lake region, the barometer remaining highest over Lake Superior until the 29th. The area of increasing pressure moved eastward to the Atlantic coast on the 28th. The temperature fell decidedly over the lake region on the 27th, and a slight fall extending southward over Tennessee and the south Atlantic states. The temperature continued to fall in the lower lake region on the 28th, the cold wave extending over New England and the middle Atlantic states, and on the 29th the temperature fell from 4° to 12° in the south Atlantic states.

AREAS OF LOW BAROMETER.

The following table gives the latitude and longitude in which each depression was first and last located, and the average hourly velocity of movement.

Areas of low barometer.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
	° ′	° ′	° ′	° ′	
No. I	46 00	88 00	49 00	67 00	34.4
II	50 30	111 00	41 00	80 30	17.3
III	51 00	105 30	44 30	59 30	29.4
IV	42 00	97 00	39 00	88 00	29.4
V	34 30	101 00	48 00	72 00	27.8
VI	44 30	87 00	45 00	58 00	24.5
VII*	52 00	107 30	46 30	80 00	26.9
	39 30	102 00	46 30	80 00	22.2
VIII	50 45	102 30	47 00	58 30	27.1
IX	39 00	78 00	45 15	57 30	29.1
Mean hourly velocity					26.8

* Centres united in N. 43° 30′, W. 96° 30′.

I.—This area is a continuation of number ix., described in the April REVIEW. On the morning of May the 1st, it was central near Escanaba, Michigan; during the day it moved southerly to Lake Michigan and thence to the northeast, and on the morning of the 2d was central near Rockliffe, Canada. General rains and high winds occurred over the lake region on the 1st, clearing on the 2d, and local rains occurred in New England on the 2d, but had cleared by the morning of the 3d. The temperature rose rapidly in advance of the storm; in the lower lake region it rose from 7° to 22° above the normal. The afternoon reports of the 1st showed a rise of 15° to 40° over the lower lake region, and from 10° to 15° in the middle Atlantic states. The following maximum velocities occurred during the passage of this storm: Escanaba, 31 miles; Milwaukee, 41; Grand Haven, Port Huron and Detroit, 36; Sandusky, 42; Buffalo, 58; and from 30 to 60 on Lake Ontario.

II.—This depression appeared on the morning of the 3d in British America north of Montana. On the morning of the 4th, it extended as a trough of low barometer from Dakota to Colorado, and rain had fallen in the upper Mississippi and Missouri valleys, the lake region, Tennessee and the Ohio valley, and Texas. The rain area extended into the eastern Gulf and south Atlantic states on the 5th, and over New England and the middle Atlantic states on the 6th. The storm moved slowly and disappeared as a distinct area of low barometer on the 8th. Severe local storms occurred in Illinois on the 6th, and brisk to high winds over the lake region on the 6th and 7th, and on the Atlantic coast on the 7th and 8th.

III.—This depression appeared north of Montana on the afternoon of the 7th. It moved southeasterly and reached the Atlantic coast on the afternoon of the 10th. Rain occurred in the northern part of the upper lake region on the 8th, and the rains caused by the preceding storm, number ii., continued in the lower lake region on the 8th and 9th. Rain fell in New England on the 7th and 8th and continued on the 9th and 10th as area iii. passed off the New England coast. High winds prevailed on Lakes Superior and Michigan on the 8th, on Lake Michigan on the 9th, on the lower lakes on the 9th and 10th, and on the New England and middle Atlantic coasts on the 10th.

IV.—This area appeared as a secondary depression in the rear of number iii. It was central at midnight of the 9th near Omaha, and moved northeasterly to Lake Michigan. On the afternoon of the 10th it was central near Milwaukee, and by the next morning had disappeared as a storm-centre. It caused local rains in the upper Mississippi valley on the 10th, and the rains caused by number iii. continued in the lake region on the 10th. Brisk to high winds from the south prevailed over Lake Michigan during the day of the 10th, but by midnight the wind had shifted to the north with a maximum velocity of twenty-five miles at Grand Haven.

V.—The afternoon report of the 11th showed this depression central near Fort Elliott. By midnight rain had fallen at all stations in the Missouri valley with cloudy weather in the Mississippi valley, which was followed during the night by local rains from Cairo to Keokuk. The movement of the storm centre as shown by the chart was irregular until the morning of the 13th, when it had reached Lake Michigan and was clearly defined as a storm centre encircled by the isobar of 29.70. General rains occurred in the upper Mississippi and Missouri valleys on the 12th, and in the upper lake region on the 12th and 13th. On the afternoon of the 13th the storm was central over Lake Erie with cloudy, rainy weather and high winds prevailing over the lake region, and brisk to high winds on the Atlantic coast. During the afternoon and night of the 13th the winds increased in velocity on the Atlantic coast, and rain fell in New England and the middle Atlantic states, continuing in New England on the 14th. The following maximum velocities are reported: on the 13th, Duluth, 28 miles; Milwaukee, 30; Grand Haven, 25; Sandusky, 37; Fort Macon, 28; Kitty Hawk, 36; Delaware Breakwater, 38. On the 14th, Block Island, 38; and from 25 to 39 on Lakes Erie and Ontario.

VI.—This low area developed during the night of the 14th, and appeared on the morning of the 15th central near Mackinaw City, Michigan. Brisk to high southerly winds had prevailed during the night over Lake Michigan. On the afternoon of the 15th the storm was central near Kingston, Canada, with high southwest to northwest winds over the lake region, and with cloudy weather and rain over the lower lakes. Maximum velocities of forty miles at Sandusky and thirty-eight miles at Buffalo, were reported. The storm was central in the Saint Lawrence valley on the afternoon of the 16th, passed off the coast of Maine on the morning of the 17th, and was central over Nova Scotia at midnight of the same day. Local rains occurred in New England on the 15th and 16th. At midnight of the 16th a maximum velocity of thirty-one miles was reported from Eastport. The winds on the middle Atlantic coasts had generally shifted to northwest with fair weather in the middle Atlantic states and clearing weather in New England. The morning map of the 16th showed a fall in temperature over the lake region of 9° to 18°. By the next morning, however, the temperature had risen the same number of degrees, and a slight rise had also occurred in the upper Mississippi and Missouri valleys. During the day the rise extended eastward and included the districts on the Atlantic coast, where it continued during the 19th.

VII.—On the morning of the 17th two depressions appeared, one central in Manitoba, the other, separated from the first by only a slight barometric ridge, central in Colorado. The movement of these two areas during the day was such that at midnight they had united, and one distinct area of low barometer, encircled by the isobar of 29.70, was central in the Missouri valley, where rain had fallen during the day. During the 18th, the storm moved easterly to Lake Michigan, accompanied by rain in the upper Mississippi valley, the upper lake region, and the Ohio valley, and by high winds on Lake Superior, a maximum velocity of thirty-one miles being reported from Duluth. During the 19th the storm moved eastward and at midnight was central near Saugeen, Canada, accompanied by high winds and cloudy, rainy weather in the lower lake region and rains in the upper Ohio valley. On the 20th, the rain area had extended into New England, continuing in the northern part on the 21st. The temperature rose in advance of the storm in the Mississippi valley, the lake region and the Ohio valley on the 17th. It continued to rise over the lake region and extended eastward to, and including the Atlantic coast districts on the 18th.

VIII.—This depression appeared north of Montana at midnight of the 18th; on the morning of the 19th it was central in Manitoba, and during the day moved nearly south into the Mississippi valley. It then moved southwest into Colorado. From the morning of the 20th until midnight of the 21st the movement of the centre was slight. By the morning of the 22d however, the centre had made a marked movement to the northeast and was located in southwestern Minnesota. From this time on it moved steadily to the north and east until it disappeared over Nova Scotia on the 24th. The rain accompanying this storm did not begin until the evening of the 20th. At this time general rains were reported from the Mississippi valley, Colorado, Wyoming, and the western Gulf states. The rain continued in these districts and extended into the Mississippi valley on the 21st, and on the 22d included the lake region; on the 23d rain fell in all districts east of the Mississippi valley. At midnight of the 22d a maximum velocity of twenty-six miles was reported from Duluth, and brisk to high winds on Lake Michigan. On the 23d velocities of twenty-five to twenty-eight miles were reported on Lake Michigan, and from twenty-six to twenty-nine miles on the lower lakes, and brisk to high southwest to northwest winds on the New England and middle Atlantic coasts. The temperature rose in the upper Mississippi and Ohio valleys and the upper lake region on the 20th, and in the lower lake region and thence southward to Florida on the 21st. It remained nearly stationary on the 22d and rose on the Atlantic coast on the 24th.

IX.—A slight barometric depression moved from Virginia northeasterly up the Atlantic coast on the 28th and 29th, accompanied by rain in the New England and middle Atlantic states on the 28th, and high winds on the coast. The following maximum velocities are reported: Kitty Hawk, 35; Hatteras, 34; Delaware Breakwater, 34; Sandy Hook, 42, and Block Island, 32 miles.

NORTH ATLANTIC STORMS DURING MAY, 1884.

[Pressure expressed in inches and in millimetres; wind-force by scale of 0—10.

The tracks of the atmospheric depressions that have appeared in the north Atlantic ocean during the month are approximately determined from reports of observations furnished by agents and captains of ocean steamships and sailing vessels, and from other miscellaneous data received at this office up to June 21, 1884.

The observations used are in general simultaneous, being taken each day at 7 a. m. Washington, or 12h. 8m. p. m. Greenwich, mean time.

Six depressions have been charted during the month; of these, numbers 1, 3, 5, and 6 are continuations of disturbances which passed over the United States and Canada, the two latter apparently filling up near the twenty-fifth meridian. Numbers 2 and 4 developed in mid-ocean and passed northeastward to the British coasts. With the exception of that charted as number 4, in which the wind attained a force of 8, none of the depressions have exhibited any great storm-energy. During May, 1884, fresh to strong breezes, variable in direction, with generally changeable weather, prevailed over the north Atlantic ocean. Dense fogs were of frequent occurrence over the region west of the fortieth meridian. The following are descriptions of the depressions charted:

1.—This is a continuation of the depression charted and described as low area i. under "areas of low barometer" in this REVIEW. On the morning of the 3d the centre of disturbance was near Anticosti island, Gulf of Saint Lawrence, and was enclosed by the isobar for 29.6 (751.8); during the day the disturbance moved eastward without displaying any storm-energy and by the 4th the region of least pressure was near N. 51°, W. 45°, where the barometer read 29.55 (750.6). During the 5th and 6th the depression continued to move slowly eastward, attended by moderate winds and generally fair weather in all quadrants, and by the 7th it was central off the Irish coast, causing rather strong southerly gales and rainy weather over the west of Ireland.

2.—The decrease of pressure which occurred over the region between N 40° and 45° and W. 40° and 50° during the 5th, indicated the development of a disturbance in that neighborhood. By the morning of the 6th, the barometer had fallen to about 29.6 (751.8), being a decrease of nearly .3 inch during the twenty-four hours; the winds remained light or moderate except to the westward of W. 50°, where they blew with the force of a strong breeze to moderate gale. The lowest barometric readings were reported by the following: s. s. "Illinois," W. H. Warrington, commanding, N. 44° 51′, W. 39° 00′, barometer 29.57 (751.1), wind ssw., force 6, weather cloudy; s. s. "State of Nevada," J. A. Stewart, commanding, N. 44° 29′, W. 43° 9′, barometer 29.6 (751.8) wind nnw., force 6, cloudy; vessels near the fiftieth parallel had easterly winds of force 2 to 4, with pressure about 29.6 (751.8). During the 6th, the disturbance moved northeastward with diminishing pressure and increasing storm-energy, and by the 7th, the centre was near N. 47°, W. 31°; on the forty-ninth parallel and to the northward, the easterly winds now increased to force 6–7, and the southerly and westerly winds in the vicinity of the centre attained the force of a fresh to strong gale (7–8). The following vessel-reports indicate the probable position of the storm centre: s. s. "State of Nevada," J. A. Stewart, commanding, N. 47° 35′, W. 37° 54′, barometer 29.08 (738.6), wind s., force 5. cloudy; s. s. "Samaria," B. Woolfenden, commanding, N. 46° 15′, W. 40° 53′, barometer 29.02 (737.1), wind w. by n., force 6, squally; s. s. "Polynesian," R. Brown, commanding, N. 46° 41′, W. 38° 56′, barometer 29.15 (740.4), wind sw. by w., 4, cloudy; s. s. "Wyoming," J. Douglas, commanding, N. 48° 38′, W. 29° 46′, barometer 29.35 (745.5), wind ssw., force 6, changeable; s. s. "Scythia," M. Murphy, commanding, N. 49° 12′, W. 30° 10′, barometer 29.35 (745.5), wind se., force 5, raining; s. s. "Salier," C. Wiegand, commanding, N. 46° 54′, W. 34° 49′, barometer 29.23 (742.4), wind w. and sw., force 8; s. s. "Rugia," A. Albers, commanding, N. 45° 24′, W. 34° 27′, barometer 29.38 (746.2), wind sw., force 7, fair; s. s. "Normandie," G. Frangeul, commanding, N. 45° 38′, W. 32° 3′, barometer 29.41 (747.0), wind sw., force 7. By the morning of the 8th there was but slight change in the position of the region of least pressure, but the area of disturbance appeared to be more extended than on the preceding day; the winds continued to blow with a force of 6 to 7, with occasional squalls of force 8. By the 9th the depression had moved by a north-northeasterly course to about N. 53°, W. 25°, where the pressure, as reported, was about 29.4 (746.7); southerly and southwesterly winds of force 4 to 6 prevailed over the region east of W. 25°, with northerly and northwesterly winds of 5 to 8 between W. 30° and 45°. During the 10th and 11th the disturbance passed north-northeastward at a considerable distance from the British coasts and disappeared on the last-mentioned date.

3.—This is a continuation of the disturbance described as low area iii. under "areas of low barometer." The depression remained near the coast of Nova Scotia during the 11th and 12th, with the pressure varying from 29.0 (736.6), to 29.4 (745.7), and causing rainy weather and moderate gales over the Maritime Provinces and the Gulf of Saint Lawrence. On the 13th, the storm-centre was south of Newfoundland and moving in an easterly direction, attended by moderate westerly and northwesterly winds to the southward and westward, and light southerly winds to the eastward. During the 14th and 15th, the course changed to northeast and the disturbance passed over the ocean without manifesting any special features. On the 16th the region of least pressure was near N. 52°, W. 20°, the barometer reading about 29.6 (751.8); during the day the depression apparently passed northeastward over the British Isles.

4.—This disturbance appeared in mid-ocean on the 12th; on that day the pressure near N. 48°, W. 34°, was about 29.3 (744.2). During the day the depression moved somewhat rapidly northeastward, with an increase of storm-energy and by the 13th, it was central off the Irish coast. The following vessel-reports indicate the character of the weather during the passage of this disturbance: Captain E. Kopff, commanding, the s. s. "Frisia," reported: "May 12th, between N. 49° and 48°, and W. 24° and 28°, had a moderate gale from sw. shifting to nw. and lasting 12 hours; at noon, Greenwich time, barometer 29.85 (758.2), rainy; 2 p. m., 29.69 (754.1), rainy; 4 p. m., 29.39 (746.5), squally; 6 p. m., 29.41 (747.0), wind shifting; 8 p. m., 29.57 (751.1), midnight, 29.83 (757.7), weather clearing, wind moderating." Captain W. McMickan, commanding, the s. s. "Gallia," reported as follows: "12th, heavy gale commenced about 9 p. m., with violent squalls veering from s. to wnw., and continued all night; split several sails; 13th, 6 a. m., furious squalls with high sea breaking over the ship fore and aft and doing some damage. At 4 p. m., 12th, barometer read 29.85 (758.2); 8. p. m., 29.62 (752.3), wind shifting gradually from s. to wnw., heavy squalls; midnight, barometer, 29.42 (747.3); 13th, 4. a. m., 29.57 (751.1), hard gale, furious squalls from wnw.; 8 a. m., 29.71 (754.6); 9 a. m., moderating; 10.39 a. m., N. 50° 11′, W. 22° 11′, barometer 30.12 (765.0); 4 p. m., 30.23 (767.8)." The steamships "Oregon" and "Hohenzollern," between N. 50°, W. 28°, and N. 48°, W. 32°, encountered strong sw. to nw. gales with very high sea on the 13th.

5.—This is a continuation of low area vi. of "areas of low barometer." On the morning of the 18th the disturbance was central between Cape Breton Island and Newfoundland the pressure at the centre being below 29.64 (752.8). During the 19th and 20th the depression apparently moved northeastward

and by the morning of the 21st, the region of least pressure was shown near N. 55° and between W. 25° and 35°, the readings ranging from 29.5 (749.3) to 29.65 (753.1), with moderate winds to the southward and eastward of the disturbance. During the 21st and 22d an area of high pressures appears to have spread westward from the European coast, and the depression gradually filled in.

6.—This is a continuation of the depression described as low area viii. under "areas of low barometer." At midnight of the 24th the storm-centre was east of Cape Breton Island, the barometer at Sidney reading 29.57 (751.1), wind se. During the 25th the depression moved northeastward and on the following day the centre was shown near N. 49°, W. 48°, where the lowest reported pressure was 29.11 (739.4); to the eastward and southeastward moderate gradients existed, so that light to fresh breezes only were reported. Over the region between N. 41° and 50°, and from W. 50° eastward to W. 35°, the barometer readings did not exceed 29.65 (753.1); west of the fiftieth meridian the gradient was somewhat steeper, so that strong northerly and northwesterly breezes to moderate gales prevailed. Duringthe 26th and 27th the disturbance apparently moved eastward south of N. 50°; by the 28th its position was not well-defined, but the circulation of the winds indicated that it had moved south of east; by the 29th it had disappeared from the chart.

OCEAN ICE.

Chart i. also exhibits the southern and eastern limits of icebergs observed in the north Atlantic ocean during the period from May 10th to June 10th. This chart is based on reports sent by shipmasters to this Office; reports furnished through the co-operation of the "New York Herald Weather Service," and from other data published in the "New York Maritime Register."

The southern limit of the ice-region was near N. 41° 15′, while its eastern limit extended to about W. 44°; icebergs were most numerous from N. 42°, W. 50°, northward and eastward to N. 44° W. 48°. During the month of May, 1884, there appears to have been a considerable movement of ice from the northern regions, the reports showing a decided increase, both in the number and size of the icebergs observed, as compared with those of April. Phenomenally large masses of ice have been observed near the harbor of Saint John's and at other points along the coast of Newfoundland.

Compared with the chart for the preceding month (April 12–May 10), there has been no material change in the position of the southern limit, but the eastern limit has moved about one and a half degrees to the eastward of its former position, while, as above stated, the area contains more icebergs than in the previous month.

A comparison with the chart for the corresponding period in 1883, shows but a slight difference in the limits of the ice region. In May, 1883, the southern limit was about half a degree farther south than in the present year, and the eastern limit was about the same in both years, but the icebergs of the present year are more numerous and of greater size than were those of 1883.

A comparison with the chart for the corresponding period in 1882, is interesting as showing that, while the limits of the ice-region and the number and size of the bergs in May, 1884, exceeded those of May, 1883, yet they did not equal, either in extent or number, those of May, 1882. In that year ice drifted along the shores of Nova Scotia, and the port of Halifax was blocked; field-ice extended from Newfoundland to Cape Breton, and from that island southward to Halifax the coast was blocked by heavy ice. Many steamers and sailing vessels were locked in the ice at the entrance of, and in the Gulf of Saint Lawrence. In May, 1882, the southern limit of the ice-region was about one and a half degrees farther south than in the present year, while the eastern limit was in W. 43°, or about two degrees east of that for 1884. More field-ice was reported in 1882 than in 1884.

The following are the reports received up to June 21, 1884:

SAINT JOHN'S, N. F., *May* 30.—The sealing brig "Confederate," Capt. Thomas Greene, of Harbor Grace, with a crew of seventy-nine men, was caught in a formidable ice nip in Notre Dame bay on April 28, and thrown completely on the floe. The ship lies over on her side with her yard-arms on the ice. On May 20 five of the crew volunteered to travel to land, distant nearly twenty miles, and report the situation. They reached Twillingate, boarded the steamer "Hercules," and arrived here this evening. They report that all the provisions are consumed except bread, and the last pound of fuel is exhausted. A powerful sealing steamer will be at once dispatched to the rescue. Captain Cress, of the steamer "Hercules," reports ice to the eastward of Notre Dame bay as far as the eye can reach, and innumerable icebergs.—(*New York Journal of Commerce.*)

May 5th.—Captain D. Thoms, of the barkentine "Corisande," reported many icebergs outside the harbor of Saint John's, Newfoundland.

6th.—S. S. "Arizona," from N. 43° 02′, W. 50° 05′ to N. 43° 40′, W. 48° 45′, passed five large icebergs.

9th.—S. S. "Samaria," between N. 43° 38′, W. 48° 10′, and N. 43° 16′, W. 49° 44′, passed several large and small icebergs; s. s. "Salier," between N. 43° 29′, W. 48° 16′, and N. 43° 3′, W. 49° 52′, passed several icebergs; s. s. "Brooklyn," passed the first iceberg in N. 46° 55′, W. 47° 54′; several others in sight; last ice seen in N. 46° 10′, W. 50° 28′.

10th.—S. S. "Wyoming," in N. 43° 32′, W. 48° 11′, passed two small icebergs and several small pieces; also at noon, in N. 43° 18′, W. 49° 21′, passed a large iceberg; 1.30 p. m., in N. 43° 4′, W. 49° 48′, passed a large iceberg about 150 feet high; 5 p. m., in N. 43° 0′, W. 51° 3′, passed a small iceberg.

13th.—S. S. "Hammonia," in N. 42° 39′, W. 48° 31′, passed two icebergs.

15th.—S. S. "Oregon," in N. 43° 29′, W. 49° 38′, passed several pieces of ice; s. s. "Britannic," in N. 44° 35′, W. 49° 08′, passed two large icebergs.

19th.—S. S. "Assyrian Monarch," in N. 48° 19′, W. 45° 45′, passed two large icebergs, one of which was a mile long.

20th.—S. S. "Sarnia," between N. 46° 40′, W. 53° 10′ and N. 47° 10′, W. 51° 30′, passed several large icebergs.

21st.—Ship "Terpsichore," in N. 46° 30′, W. 48° 30′, passed five large icebergs; s. s. "Salerno," in N. 42° 50′, W. 48° 20′, passed an iceberg about 150 feet high; s. s. "Eider," at 4.25 a. m. in N. 42° 57′, W. 49° 2′, passed south of two large icebergs, which proved to be about six hundred feet long and twenty feet above water.

22d.—S. S. "Arizona," in N. 44° 50′, W. 45° 40′, passed an iceberg; also, in N. 44° 45′, W. 45° 53′, passed another.

23d.—S. S. "Aurania," in N. 47° 02′, W. 50° 28′, passed two icebergs bearing thirteen miles north; ship "Cheseborough," in N. 45°, W. 45°, passed a large iceberg. A gigantic iceberg ran ashore in Saint John's bay on the morning of the 23d. An iceberg estimated at not less than seven miles long was seen passing southward at a distance of forty miles from Saint John's. A large iceberg nine and a fourth miles in length was reported thirty miles off Southern Gravis island, Newfoundland. S. S. "Circassian," in N. 46° 51′, W. 52° 38′, passed several icebergs and loose pieces of ice; at 6.45 a. m., passed Cape Race and saw several bergs and loose pieces of ice.

24th.—S. S. "State of Florida," in N. 43° 30′, W. 44° 50′, passed an iceberg; s. s. "Hibernian," in N. 43° 00′, W. 48° 56′, passed several pieces of ice; s. s. "Saint Laurent," between N. 43° 03′, W. 48° 42′ and N. 42° 52′, W. 50° 07′, passed two icebergs; s. s. "Wyoming," in N. 42° 13′, W. 50° 44′, passed an iceberg and several small pieces, also in N. 42° 30′, W. 48° 54′, passed a very large iceberg.

25th.—S.S. "Rhein," in N. 43° 39′, W. 48° 40′, passed two large icebergs; s. s. "State of Nevada," in N. 42° 22′, W. 49° 11′, passed an iceberg; ship "Cheseborough in N. 44° W. 49° passed a large iceberg; s. s. "Wyoming," in N. 43° 29′, W. 44° 50′, passed a low iceberg.

26th.—S. S. "Heckla" in 42° W. 50°, passed several icebergs.

27th.—Bark "Fluorine," in N. 45° 24′, W. 53° 25′, passed

a large iceberg and several pieces of field-ice; s.s. "Brooklyn" saw several icebergs off Cape Race; last ice seen in N. 47° 24′, W. 49° 26′; bark "Esmeralda," in N. 46° W. 50°, passed four small icebergs; s.s. "Salier," between N. 42° 16′, W. 50° 42′ and N. 42° 47′, W. 47° 53′, passed eleven large icebergs and some smaller ones.

28th.—S. S. "City of Chester," in N. 42° 11′, W. 48° 49′, passed an iceberg and several pieces of ice.

29th.—S. S. "Westphalia," in N. 41° 42′, W. 47° 47′, passed a large iceberg.

30th.—S. S. "Alaska," in N. 43° 37′, W. 48° 03′, passed an iceberg, also in N. 43° 27′, W. 48° 17′ passed another; s. s. "Weser," in N. 41° 30′, W. 47° 30′, passed a small iceberg.

June 1st.—S. S. "Furnessia," in N. 43° 01′, W. 49° 43′, passed an iceberg; s. s. "Nürnberg," between N. 42° 56′, W. 48° 11′ and N. 42° 54′, W. 48° 32′, passed several icebergs.

2d.—S. S. "Pieter de Coninck," in N. 44° 34′, W. 49° 10′, passed an iceberg.

5th.—S. S. "City of Rome," in N. 44° 36′, W. 47° 35′, passed two large icebergs; s. s. "Critic," in N. 41° 30′, W. 48° 51′, passed several icebergs.

6th.—S. S. "Grecian Monarch," in N. 46° 23′, W. 50° 27′, passed two icebergs and several pieces of ice; s. s "Brooklyn City," in N. 44° 06′, W. 55°, passed a large iceberg; s. s. "Rhætia," in N. 42° 34′, W. 50° 23′, passed two large icebergs about one hundred to one hundred and fifty feet high; s. s. "Justitia," in N. 42° 15′, W. 48° 04′, passed a large iceberg with floating ice around it.

TEMPERATURE OF THE AIR.

[*Expressed in degrees, Fahrenheit.*]

The distribution of mean temperature over the United States and Canada for May, 1884, is exhibited on chart ii. by the dotted isothermal lines.

In the following table are shown the normal temperatures for May, the mean temperatures for May, 1884, and the departures from the normal, in the several geographical districts, as deduced from the records of the Signal Service:

Average temperatures for May, 1884.

Districts.	Average for May, Signal-Service observations.		Comparison of May, 1884, with the average for several years.
	For several years.	For 1884.	
	°	°	°
New England	54.5	53.6	0.9 below.
Middle Atlantic states	61.1	61.9	0.8 above.
South Atlantic states	69.7	71.6	1.9 above.
Florida peninsula	76.9	78.1	1.2 above.
Eastern Gulf states	72.6	73.0	0.4 above.
Western Gulf states	73.6	72.2	1.4 below.
Rio Grande valley	80.6	78.4	2.2 below.
Tennessee	69.1	68.5	0.6 below.
Ohio valley	65.3	63.7	1.6 below.
Lower lake region	56.5	55.3	1.2 below.
Upper lake region	51.7	51.2	0.5 below.
Extreme northwest	53.0	53.5	0.5 above.
Upper Mississippi valley	62.0	61.8	0.2 below.
Missouri valley	61.4	60.1	1.3 below.
Northern slope	52.7	53.5	0.8 above.
Middle slope	61.4	58.4	3.0 below.
Southern slope	71.9	66.8	5.1 below.
Southern plateau	68.5	65.5	3.0 below.
Northern plateau	55.8	61.0	5.2 above.
North Pacific coast region	54.8	58.2	3.4 above.
Middle Pacific coast region	62.0	63.4	1.4 above.
South Pacific coast region	66.9	66.1	0.8 below.
Mount Washington, N. H	33.5	32.0	1.5 below.
Pike's Peak, Colo	22.1	20.4	1.7 below.
Salt Lake City, Utah	57.9	57.7	0.2 below.

The month was warmer than the average in the states bordering on the Atlantic south of New England, in the east Gulf states, north and middle Pacific coast regions, northern plateau, northern slope, and extreme northwest. In the districts above-named the mean temperature of May exceeded the normal, as follows: middle Atlantic and east Gulf states, extreme northwest and northern slope from 0°.4 to 0°.8; south Atlantic states, Florida peninsula, and middle Pacific coast region, from 1°.2 to 1°.9; north Pacific coast region and northern plateau, from 3°.4 to 5°.2. In all other portions of the country the month was colder than the average, the deficiencies in the mean temperatures being less than 1° in southern California, the upper lake region, Tennessee, and the upper Mississippi valley, the average in the last-named districts being only 0°.2 below the normal. The most marked deficiencies occurred in the middle and southern slopes, and southern plateau, where they varied from 3° to 5°.

The following are some of the highest and lowest monthly mean temperatures reported from the Signal Service stations:

Stations reporting highest.	°	Stations reporting lowest.	°
Key West, Florida	80.9	Pike's Peak, Colorado	20.4
Rio Grande City, Texas	80.1	Mount Washington, New Hampshire	32.0
Cedar Keys, Florida	77.0	Eastport, Maine	46.5
Brownsville, Texas	76.7	Marquette, Michigan	47.2
Jacksonville, Florida	76.5	Mackinaw City, Michigan	47.7
New Orleans, Louisiana	76.4	Alpena, Michigan	48.5
Savannah, Georgia	76.1	Duluth, Minnesota	48.9
Galveston, Texas	75.9	Escanaba, Michigan	49.1
Indianola, Texas	75.4	Deadwood, Dakota	49.2
Yuma, Arizona	75.3	Cheyenne, Wyoming	49.6
Charleston, South Carolina	74.8	Fort Maginnis, Montana	50.6
Mobile, Alabama	74.6	Buffalo, New York	52.1
Montgomery, Alabama	74.6	Fort Shaw, Montana	53.0

DEVIATIONS FROM MEAN TEMPERATURE.

The departures exhibited by the reports from the regular Signal Service stations are shown in the table of comparative temperatures for May, 1884. Voluntary observers report the following notes in connection with this subject:

Arkansas.—Lead Hill, Boone county: mean temperature, 67°.8, is 3°.1 above the May average of the last two years.

Dakota.—Webster, Day county: mean temperature, 57°.6, is 6°.2 above that for May, 1883.

Illinois.—Riley, McHenry county: mean temperature, 57°.0, is 0°.3 above the May average of the last twenty-three years. The mean temperature of the spring season of 1884, is 43°.3, or 0°.3 below the mean of the corresponding period of the last twenty-three years.

Swanwick, Perry county: mean temperature, 63°.5, is 0°.2 above the May average of the last three years.

Mattoon, Coles county: mean temperature, 66°.0, is 0°.5 above the May average of the last five years.

Anna, Union county: mean temperature, 65°.5, is 1°.7 below the May average of the last nine years.

Indiana.—Logansport, Cass county: mean temperature, 62°.0, is 2°.4 below the May average of the last twenty-five years. During that period the average maximum temperature was 91°.1, the highest being 99° in 1870 and 1881, and the lowest maximum, 83°, occurred in 1861. The average minimum temperature was 38°.6, the lowest being 28°, which occurred in 1876 and 1877.

Vevay, Switzerland county: mean temperature, 64.°4, is 1°.0 below the May average of the last twenty years.

Wabash, Wabash county: mean temperature, 61°.6, is 0°.5 below the May average of the last eight years.

Lafayette, Tippecanoe county: mean temperature, 59°.5, is 2°.9 below the May average of the four preceding years; the mean temperature of the spring of 1884, is 49°.3 or 0°.4 below the average of the corresponding seasons of the some period.

Kansas.—Independence, Montgomery county: mean temperature, 63°.8, is 2°.1 below the May average of the last thirteen years.

Lawrence, Douglas county: mean temperature, 62°.2, is 3°.6 below the May average of the last seventeen years.

Wellington, Sumner county: mean temperature, 60°.2, is 2°.9 below the May average of the last six years.

Maine.—Gardiner, Kennebec county: mean temperature, 51°.2, is 2°.3 below the May average of the last forty-eight years.

Maryland.—Fallston, Harford county: mean temperature, 60°.5, is 0.°4 below the May average of the last thirteen years.

Table of maximum and minimum temperatures for May, 1884.

State or Territory.	Signal Service.			U. S. Army Post Surgeons, or Voluntary Observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
		°	°		°	°
Alabama	Montgomery	93	59	Calera	98	50
Do	Mobile	93	59	Birmingham	96	41
Arizona	Yuma	104	49	Texas Hill	108	56
Do	Willcox	98	15	Pantano	90	40
Arkansas	Fort Smith	92	46	Lead Hill	93	46
Do	Little Rock	87	54	Prescott	88	34
California	Red Bluff	91	50	Mammoth Tank	113	62
Do	Fort Bidwell	86	29	Boca	68	30
Colorado	West Las Animas	90	28	Fort Lyon	91	17
Do	Pike's Peak	40	− 3	Fort Lewis	71	22
Connecticut	New Haven	85	32	Southington	91	26
Do	New London	83	35	Bethel	88	26
Dakota	Fort Buford	86	25	Fort Randall	89	33
Do	Fort Bennett	86	32	Fort Meade	82	25
Delaware	Del. Breakwater	81	46			
District of Columbia	Washington City	92	42	West Washington	92	42
Florida	Jacksonville	91	62	Waldo	101	58
Do	Cedar Keys	90	60	Live Oak	99	54
Georgia	Savannah	90	58	Way Cross	103	54
Do	Augusta	90	54	Allapaha	96	45
Idaho	Lewiston	92	39	Fort Lapwai	92	30
Do	Cœur d'Alene	85	23			
Illinois	Cairo	82	49	Greenville	90	49
Do	Chicago	78	40	Polo	82	30
Indiana	Indianapolis	84	41	Vevay	89	43
Do				Sunman	86	34
Indian Territory	Cantonment	90	36	Fort Reno	89	37
Iowa	Dubuque	81	39	Mount Vernon	88	41
Do	Des Moines	80	35	Cedar Rapids	80	33
Kansas	Dodge City	87	32	Allison	92	32
Do	Leavenworth	84	39	Topeka	86	30
Kentucky	Louisville	89	46	Frankfort	86	43
Louisiana	Shreveport	91	56	Alexandria	93	45
Do	New Orleans	86	62	Minden	99	51
Maine	Portland	83	39	Cornish	83	38
Do	Eastport	73	34	Gardiner	75	32
Maryland	Baltimore	89	45	Sandy Springs	92	38
Do	Ocean City	86	42	Woodstock	91	38
Massachusetts	Boston	88	35	Westborough	93	37
Do	Thatcher's Island	69	38	Princeton	82	27
Michigan	Detroit	81	36	Hudson	83	28
Do	Alpena	80	30	Swartz Creek	81	28
Minnesota	Moorhead	86	28	Hastings	84	32
Do	Saint Vincent	85	29	Northfield	80	31
Mississippi	Vicksburg	88	57	Meridian	97	51
Missouri	Saint Louis	86	44	Dresden	90	43
Do				Oregon	83	32
Montana	Fort Benton	88	30	Fort Assinaboine	88	27
Do	Poplar River	84	24	Fort Ellis	82	20
Nebraska	North Platte	88	32	Clear Creek	88	39
Do	Omaha	82	36	Red Willow	86	22
New Hampshire	Mount Washington	55	12	Contoocook	85	32
Do				Bristol	80	28
New Jersey	Little Egg Harbor	90	41	Vineland	92	42
Do	Sandy Hook	86	45	South Orange	88	40
New Mexico	Fort Craig	92	30	Fort Union	79	12
Do				Puerto de Luna	90	43
New York	Albany	85	39	Ithaca	90	32
Do	Rochester	83	33	Dannemora	79	26
North Carolina	Kitty Hawk	89	42	Chapel Hill	94	43
Do	New River Inlet	86	46	Brevard	88	49
Ohio	Sandusky	87	42	Waverly	90	36
Do	Toledo	82	36	Junction	83	28.5
Oregon	Ashland	93	33	Albany	88	46
Do	Linkville	80	24	Fort Klamath	82	21
Pennsylvania	Erie	86	37	Easton	92	47
Do	Pittsburg	92	39	Troy	86	26
Rhode Island	Narragansett Pier	75	33			
Do	Point Judith	70	34			
South Carolina	Charleston	91	60	Cheraw	96	46
Do				Kingstree	95	46
Tennessee	Knoxville	89	46	Hurricane Switch	90	41
Do	Chattanooga	89	52	Kingston Springs	87	39
Texas	El Paso	103	40	Cuero	94	52
Do	Fort Elliott	90	36	Weatherford	86	43
Utah	Salt Lake City	84	36	Nephi	80	30
Vermont				Woodstock	85	25
Virginia	Cape Henry	92	47	Accotink	92	50
Do	Lynchburg	91	45	Variety Mills	90	37
Washington Territory	Olympia	87	36	Pleasant Grove	85	32
Do	Fort Spokane	89	25	Fort Spokane	91	30
West Virginia				Helvetia	88	36
Wisconsin	La Crosse	79	38	Evansville	84	30
Do	Milwaukee	79	35	Neillsville	75	29
Wyoming	Cheyenne	80	22	Fort Fred Steele	80	16

Massachusetts.—Worcester, Worcester county: mean temperature, 53°.7, is below the May average of a period of forty-five years.

Missouri.—Saint Louis, mean temperature, 64°.7, is 1°.6 below the normal of May.

New York.—Palermo, Oswego county: mean temperature, 52.4, is 0°.7 below the May average of the last thirty-one years.

Dannemora, Clinton county: mean temperature, 53°.8, is 0°.7 below the May average of the four preceding years.

Ohio.—Wauseon, Fulton county: mean temperature, 58°.3, is 0°.5 below the May average of the last fourteen years. The highest May mean of that period, 64°.3, occurred in 1880; the lowest, 52°.2, occurred in 1882.

Pennsylvania.—Dyberry, Wayne county: mean temperature, 55°.3, is 0°.5 above the May average of the last eighteen years.

Texas.—New Ulm, Austin county: mean temperature, 72°.2, is 2°.4 below the May average of the last twelve years.

Vermont.—Woodstock, Windsor county; mean temperature, 54°.2, is 0°.1 above the May average of the last seven years.

Virginia.—Wytheville, Wythe county: mean temperature, 62°.7, is 1°.9 below the May normal for a period of twenty-one years.

Variety Mills, Nelson county: mean temperature, 64°.4, is 0°.7 above the May average of the last seven years. The mean temperature of the spring of 1884 is 53°.7, or 0°.6 below the average of the corresponding period of the last seven years.

West Virginia.—Helvetia, Randolph county: mean temperature, 57°.8, is 0°.5 below the May average of the last eight years.

MONTHLY RANGES OF TEMPERATURE.

The monthly ranges of temperature were greatest in Oregon and Washington Territory (except along the immediate coast), and from Arizona, New Mexico, and western Texas, northward to British America; they were least along the coasts of the Gulf of Mexico and Pacific ocean.

Monthly ranges of 55° or more occurred at the following stations: Maricopa and Yuma, Arizona, and Dodge City, Kansas, 55°; Linkville, Oregon, Saint Vincent, Minnesota, and North Platte, Nebraska, 56°; Moorhead, Minnesota, 57°; Forts McDowell and Thomas, Arizona, Cheyenne, Wyoming, and Fort Benton, Montana, 58°; Fort Bidwell, California, and Poplar River, Montana, 59°; Ashland, Oregon, Fort Verde, Arizona, Fort Custer, Montana, and Fort Buford, Dakota, 60°; San Carlos, Arizona, 61°; Fort Craig, New Mexico, and Cœur d'Alene, Idaho, 62°; El Paso, Texas, and West Las Animas, Colorado, 63°; Phœnix, Arizona, 68°.

Monthly ranges of 33° and less occurred at the following stations: Fort Canby, and Neah Bay, Washington Territory, and Block Island, Rhode Island, 33°; Los Angeles, California, Indianola and Palestine, Texas, Hatteras, North Carolina, and Savannah, Georgia, 32°; San Francisco, California, Thatcher's Island, Massachusetts, Smithville, North Carolina, Chincoteague, Virginia, and Charleston, South Carolina, 31°; Vicksburg, Mississippi, Atlanta, Georgia, and Cedar Keys, Florida, 30°; Jacksonville, Florida, 28°; Cape Mendocino, California, 27°; Fort Macon, North Carolina, and Pensacola, Florida, 26°; Galveston, Texas, and San Diego, California, 25°; New Orleans, Louisiana, 24°; Key West, Florida, 20°.

GREATEST DAILY RANGES OF TEMPERATURE.

The greatest daily ranges of temperature varied in the several districts as follows:

New England.—From 21° at Block Island, Rhode Island, on the 25th, to 34° at Boston, Massachusetts, on the 2d.

Middle Atlantic states.—From 22° at Cape May, New Jersey, on the 5th, to 32° at New York City, on the 2d, and Washington City, District of Columbia, on the 18th.

South Atlantic states.—From 18° at Fort Macon, North Carolina, on the 4th, to 30° at Kitty Hawk, North Carolina, on the 1st.

Florida peninsula.—From 15° at Key West, on the 12th, to 19° at Cedar Keys, on the 21st.

East Gulf states.—From 16° at New Orleans, Louisiana, on the 9th, to 28° at Mobile and Montgomery, Alabama, on the 10th.

West Gulf states.—From 18° at Galveston, Texas, on the 9th, to 37° at Fort Smith, Arkansas, on the 9th.

Rio Grande valley.—From 25° at Brownsville, Texas, on the 10th, to 32° at Rio Grande City, Texas, on same date.

Tennessee.—From 29° at Nashville, on the 18th, to 32° at Knoxville, on the 31st.

Ohio valley.—From 23° at Cincinnati, Ohio, on the 9th, to 36° at Pittsburg, Pennsylvania, on the 31st.

Lower lake region.—From 26° at Toledo and Cleveland, Ohio, on the 17th and 21st, respectively, to 40° at Erie, Pennsylvania, on the 1st.

Upper lake region.—From 24° at Grand Haven, Michigan, on the 5th, to 35° at Alpena, Michigan, on the 31st.

Extreme northwest.—From 35° at Bismarck, Dakota, on the 7th, to 42° at Fort Buford, Dakota, on the 23d.

Upper Mississippi valley.—From 23° at Saint Louis, Missouri,

Table of comparative maximum temperatures for the month of May.

State or Territory.	Maximum for May, 1884, Signal Service.		Maximum since Signal-Service stations were opened—3 to 13 years.			Highest from any other source.			
	Station.	Temperature.	Station.	Temperature.	Year.	Place.	Temperature.	Year.	Length of record.
		°		°			°		Years.
Alabama	Montgomery	93	Montgomery	98	1875	Mount Vernon Arsenal	102		34
Do	Mobile	93	Mobile	96	1878	Mobile	92		35
Arizona	Maricopa	104	Maricopa Wells	106	1876	Fort Verde	111		12
Do	Yuma	104	Yuma	109	1883	Fort Mojave	110		11
Arkansas	Little Rock	87	Little Rock	91	1880	Washington, near	94		28
Do	Fort Smith	92	Fort Smith	93	1883	Fort Smith	93		21
California	Red Bluff	91	Los Angeles	100	1883	Fort Miller	113		14
Do	Fort Bidwell	86	Visalia	101	1882	Fort Yuma	108		24
Colorado	Denver	80	Denver	92	1874	Fort Lyon	99	1880	23
Do	Pike's Peak	40	Pike's Peak	47	1880	Fort Garland	93		22
Connecticut	New Haven	85	New Haven	89	1880	New Haven	93		86
Do	New London	83	New London	89	1881	Fort Trumbull	92		48
Dakota	Fort Buford	80	Fort Sully	101	1874	Fort Abercrombie	102		19
Do	Fort Bennett	86	Pembina	96	1874	Fort Randall	101		23
Delaware	Delaware Breakwater	81	Delaware Breakwater	89	1880	Fort Delaware	91		45
Do						Dover	94	1880	7
District of Columbia	Washington City	92	Washington City	96	1880	Washington City	96		59
Florida	Jacksonville	91	Jacksonville	98.5	1878	Fort Barrancas	93		53
Do	Key West	91	Saint Mark's	94	1874	Houston	100	1879, 1880	4
Georgia	Augusta	90	Augusta	100	1878	Oglethorpe Barracks	97	1878	40
Do	Savannah	90	Tybee Island	99	1878	Savannah	97		37
Idaho	Boisé City	83	Boisé City	88	1881	Fort Lapwai	101		18
Do	Lewiston	92	Lewiston	88	1881, 1882	Fort Boisé	95		10
Illinois	Cairo	82	Cairo	92	1874	Chicago	98		38
Do	Chicago	78	Chicago	89	1874	Mattoon	98	1876	2
Indiana	Indianapolis	84	Indianapolis	89	1874, 1881	Logansport	99	1881	2
Do						Vevay	98		13
Indian Territory	Cantonment	90	Fort Sill	97	1880	Fort Arbuckle	100		20
Do	Fort Reno	90	Fort Gibson	94	1874, 1880	Fort Gibson	99		47
Iowa	Dubuque	81	Dubuque	94	1874	Boonesborough	96	1880	4
Do	Des Moines	80	Des Moines	93	1880	Nora Springs	96	1876	6
Kansas	Dodge City	81	Dodge City	96	1879, 1880	Fort Larned	99		18
Do	Leavenworth	80	Leavenworth	94	1874, 1875	Fort Riley	99		23
Kentucky	Louisville	88	Louisville	93	1881	Newport Barracks	90		29
Do						Bowling Green	90	1880	3
Louisiana	Shreveport	91	Shreveport	101	1875	Baton Rouge	99		50
Do	New Orleans	86	New Orleans	92	1877	Fort Jesup	98		23
Maine	Portland	83	Portland	94	1880	Brunswick	98		53
Do	Eastport	73	Eastport	80	1877	Portland	93		37
Maryland	Baltimore	89	Baltimore	95	1881	Fort Washington	97		38
Do	Ocean City	86				New Market	98	1877	3
Massachusetts	Boston	88	Boston	97	1880	Somerset	97	1880	7
Do	Thatcher's Island	69	Springfield	94	1880	Williamstown	95		60
Michigan	Marquette	72	Marquette	95	1874	Detroit	94		38
Do	Detroit	81	Detroit	90.5	1881	Ontonagon	94		11
Minnesota	Saint Paul	81	Saint Paul	94	1874	Fort Ripley	101		16
Do	Moorhead	86	Breckenridge	93	1874	Fort Snelling	92		55
Mississippi	Vicksburg	88	Vicksburg	95	1874, 1877	Brookhaven	98	1875	5
Missouri	Saint Louis	86	Saint Louis	93	1874	Corning	100	1875	7
Do						Saint Louis	97	1878	40
Montana	Fort Custer	84	Fort Keogh	98	1881	Fort Shaw	98		13
Do	Fort Benton	88	Fort Benton	93	1875	Fort Benton	94		5
Nebraska	North Platte	88	North Platte	94	1880	Fort McPherson	100	1879	12
Do	Omaha	82	Omaha	92	1880	Fort Calhoun	98		5
Nevada			Winnemucca	86	1881, 1882	Camp Halleck	104		7
New Hampshire	Mount Washington	55	Mount Washington	62	1879, 1880	Auburn	96	1881	5
Do						Grafton	96	1880	2
New Jersey	Sandy Hook	86	Sandy Hook	93	1880	New Lisbon	101	1880	1
Do	Little Egg Harbor	90	Cape May	93	1875	New Brunswick	98	1880	5
New Mexico	Fort Craig	92	La Mesilla	101	1879, 1881	Fort McRae	109		11
Do			Socorro	97	1880	Fort Craig	108		25
New York	New York City	85	New York City	94	1880	West Point	101	1880	55
Do	Oswego	83	Oswego	94	1879	Newburg	98		40
North Carolina	Wilmington	89	Wilmington	95	1878	Weldon	100	1880	7
Do	Kitty Hawk	89	Kitty Hawk	93	1880	Fort Johnson	92		57
Ohio	Cincinnati	85	Cincinnati	94	1874, 1875	Cincinnati	96	1877, 1881	42
Do	Cleveland	84	Cleveland	92	1879	Marietta	94		53
Oregon	Ashland	93	Umatilla	95.5	1882	Fort Dalles	96		15
Do	Portland	90	Portland	86	1878	Fort Haskins	95		8
Pennsylvania	Philadelphia	88	Philadelphia	96	1880	Philadelphia	98	1880	120
Do	Pittsburg	92	Pittsburg	95	1881	Milton	100	1881	2
Rhode Island	Block Island	72	Newport	85	1881	Providence	91		35
Do	Narragansett Pier	75	New Shoreham	78	1881	Fort Adams	91	1880	40
South Carolina	Charleston	91	Charleston	94	1878	Charleston	94		105
Do						Aiken	97	1881	6
Tennessee	Knoxville	89	Memphis	96	1879	Humboldt	98		4
Do	Nashville	88	Nashville	93	1874, 1879	Ashwood	96	1879	3
Texas	El Paso	103	Eagle Pass	116	1879	Fort Ringgold	123	1879	32
Do	Rio Grande City	101	Uvalde	113	1879	Fort Stockton	111		15
Utah	Salt Lake City	84	Salt Lake City	91	1874	Fort Douglas	91		10
Do						Mount Carmel	96.4	1876	3
Vermont			Burlington	91	1880	Charlotte	96	1878	7
Do						Lunenburg	88		16
Virginia	Norfolk	91	Norfolk	98	1880	Alexandria	96		12
Do	Lynchburg	91	Lynchburg	96	1881	Accotink	97	1880, 1881	6
Washington Territory	Dayton	72	Dayton	90	1880	Fort Walla Walla	99		14
Do	Olympia	87	Olympia	87	1878	Fort Vancouver	98		19
West Virginia			Morgantown	91	1875	Weston	100	1877	2
Do						Helvetia	90	1877	5
Wisconsin	La Crosse	79	La Crosse	96	1874	Embarras	98		14
Do	Milwaukee	79	Milwaukee	90	1874	Fort Howard	97		31
Wyoming	Cheyenne	80	Cheyenne	88	1874	Fort Laramie	98		27

on the 30th, to 33° at Des Moines, Iowa, and Saint Paul, Minnesota, on the 16th, and at Dubuque, Iowa, on the 30th.

Missouri valley.—From 29° at Leavenworth, Kansas, on the 19th, to 44° at Fort Bennett, Dakota, on the 15th.

Northern slope.—From 30° at Helena, Montana, on the 2d, to 45° at Fort Benton, Montana, on the 14th.

Middle slope.—From 24° on the summit of Pike's Peak, Colorado, on the 28th, and 33° at Denver, Colorado, on the 9th, to 50° at West Las Animas, Colorado, on the 9th.

Southern slope.—From 39° at Fort Concho, Texas, on the 6th, to 46° at Fort Stockton, Texas, on the 17th.

Southern plateau.—From 28° at Fort Grant, Arizona, on the 3d, to 48° at El Paso, Texas, and Fort Thomas, Arizona, on the 6th and 7th, respectively.

Middle plateau.—30° at Salt Lake City, Utah, on the 8th.

Northern plateau.—From 30° at Boisé City, Idaho, on the 23d, to 40° at Dayton, Washington Territory on the 30th.

North Pacific coast region.—From 23° at Fort Canby, Washington Territory on the 29th, to 44° at Olympia, Washington Territory on the 30th.

Middle Pacific coast region.—From 21° at San Francisco, California, on the 8th, to 34° at Red Bluff, California, on the 17th.

South Pacific coast region.—From 18° at San Diego, California, on the 2d to 41° at Yuma, Arizona, on the 8th.

FROSTS.

Frosts occurred in the various districts on the following dates:

New England.—4th, 6th, 13th, 15th, 17th, 21st, 22d, 28th to 31st. On the summit of Mount Washington, 2d, 3d, 4th, 7th, 8th, 10th to 18th, 28th, 29th, 30th.

Middle Atlantic states.—3d, 4th, 12th, 13th, 15th to 18th, 29th, 30th, 31st.

South Atlantic states.—Highlands, North Carolina, 30th; Raleigh, North Carolina, 29th, 30th, 31st.

Ohio valley.—3d, 10th, 12th, 14th, 16th, 29th, 30th.

Lower lake region.—2d, 3d, 12th to 18th, 28th, 29th, 30th.

Upper lake region.—2d, 3d, 11th, 13th to 18th, 20th, 26th, 28th, 29th, 30th.

Extreme northwest.—1st, 2d, 3d, 5th, 12th, 14th, 18th, 20th.

Upper Mississippi valley.—2d, 3d, 8th, 11th, 12th, 14th, 16th, 20th, 28th, 29th, 30th.

Missouri valley.—1st, 2d, 3d, 5th, 6th, 8th, 11th, 12th, 13th, 15th, 27th, 29th, 30th.

Northern slope.—1st to 7th, 12th, 14th, 21st.

Middle slope.—2d, 3d, 5th to 8th, 14th, 19th; on the summit of Pike's Peak, 7th, 15th, 18th, 19th, 24th, 26th, 27th.

Southern plateau.—2d to 5th, 16th, 21st, 23d.

Middle plateau.—Nephi, Utah, 4th.

Northern plateau.—Boisé City, Idaho, 1st, 4th.

North Pacific coast region.—Roseburg, Oregon, 4th; Olympia, Washington Territory, 28th, 29th.

Middle Pacific coast region.—Hydesville, California, 4th, 6th.

The frosts which occurred from the 28th to 31st during the prevalence of high area vii. were very destructive in the lake region, New England, and the northern part of the middle Atlantic states, as will be seen from the following reports:

Connecticut.—New Haven: the frost of the 29–30th caused a large amount of damage in New Haven county, nearly all crops being totally ruined. It is estimated that the damage done in this state will approximate $1,000,000.

Delaware.—Wilmington, 30th: the peach crop on the peninsula is reported to have suffered no injury from the recent cold weather.

Illinois.—Rockford, Winnebago county: garden vegetables and grape vines were injured by the frosts of the 29th.

Galena, Jo Daviess county: a severe frost occurred on the morning of the 29th; the fruit buds were destroyed to a great extent, and corn and potatoes were badly damaged.

Sandwich, DeKalb county: there was a heavy frost on the morning of the 29th, which caused damage in some localities.

Woodstock, McHenry county: a severe frost, causing injury to vegetables, occurred on the night of the 15–16th. During the night of the 28–29th this region was visited by the severest frost that has occurred for many years at so late a date; garden vegetables suffered severely; ice formed to a thickness of one-eighth inch.

Mount Carroll, Carroll county, a heavy frost occurred on the morning of the 16th; thin ice formed.

Indiana.—Fort Wayne, Allen county: the heavy frost on the night of the 28–29th did serious injury to vegetables.

South Bend, Saint Joseph county: the frost on the morning of the 29th was very severe throughout this county and damaged all early vegetation.

Plymouth, Marshall county: the frost of the 29th caused no injury in this county.

Muncie, Delaware county: frost occurred on the 29th, but owing to the late planting no serious injury was done.

Wabash, Wabash county: a light frost occurred on the night of the 28–29th, but caused no damage.

La Fayette, Tippecanoe county: a light frost occurred on the 29th; corn was slightly injured in some localities, and early vegetables were considerably damaged.

Angola, Steuben county: a heavy frost occurred during the night of the 28–29th, doing considerable damage to early corn, potatoes and other vegetables.

Iowa.—Guttenberg, Clayton county: the frost of the 29th was very severe in Turkey river valley; corn, potatoes and other vegetables were destroyed.

Manchester, Delaware county: the frosts on the 29th and 30th killed tender vegetables.

Preston, Jackson county: considerable damage was done by the frost on the 29th.

Charles City, Floyd county: a light frost occurred in this vicinity on the 29th; but little damage was done.

Des Moines: a light frost occurred in the bottom lands on the 29th.

Waterloo, Black Hawk county: frost occurred in this section on the 29th, causing no serious injury. Reports from Franklin, Hardin, Bremer, Buchanan and Butler counties state that light frost occurred in those localities with possible damage to fruit on lowlands.

Iowa City, Johnson county: the frost of the 29th was quite general, but the damage slight.

Dubuque: farmers from surrounding counties report that the frost on the 29th caused some injury to corn and vegetables.

Brooklyn, Poweshiek county: the heavy frost on the morning of the 30th, ruined several thousand acres of corn in the lowlands in this county.

Kentucky.—Louisville: the tobacco crop is reported to have been injured by the cold weather of the 29th.

Maine.—Gardiner, Kennebec county: vegetation was badly damaged by the cold weather of the 31st.

Portland: the frost of the 31st caused condsiderable damage to the gardens in this vicinity.

Rockland, Knox county: a severe frost occcurred on the morning of the 30th, but the crops were not sufficiently advanced to sustain serious injury.

Bangor: the heavy frost on the morning of the 30th caused slight injury to the crops in this vicinity.

Maryland.—Ocean City, Worcester county: corn and sweet potatoes were damaged by frost on the 29th.

Massachusetts.—Taunton, Bristol county: the damage resulting from the frosts of the 30th and 31st in this county alone is estimated at $100,000.

Amherst, Hampshire county: great damage was done by the frost of the 30th.

Somerset, Bristol county: the frost on the 30th was very destructive.

Westfield, Hampden county: all early vegetables were destroyed by the frost on the night of the 29–30th.

Athol, Worcester county: ice formed to a thickness of one-fourth inch on the morning of the 30th.

Boston: during the night of the 29–30th, the ground froze to a depth of from one-fourth to one-half inch throughout New England; incalculable damage was done to crops.

Great Barrington, Berkshire county: a very heavy frost, causing great damage to vegetation, occurred during the night of the 29–30th; the temperature fell to 22°

Michigan.—Swartz creek, Genesee county: the frost of the 29th did great damage to garden vegetables; apples and cherries were nearly all killed.

Port Huron: great damage was done by the heavy frost of the 29th.

Grand Rapids, Kent county: a severe frost occurred on the night of the 28–29th; vegetables in the lowlands suffered serious injury.

Niles, Berrien county: a light frost occurred on the morning of the 16th; tender vegetation was injured.

Corunna, Shiawassee county: the heavy frost on the night of the 28–29th killed vegetables and caused injury to the fruit crops.

Ann Arbor, Washtenaw county: the frost of the 29th ruined the corn, grape and strawberry crops in this section.

Lapeer, Lapeer county: a severe frost damaging garden vegetables occurred during the night of the 28–29th; ice formed to a thickness of one-fourth inch.

Hudson, Lenawee county: the frost on the morning of the 29th killed nearly all of the garden vegetables and fruit in this vicinity.

Marshall, Calhoun county: a severe frost injuring the growing crops, occurred during the night of the 28–29th.

Richmond, Macomb county: the frost on the morning of the 29th caused a large amount of damage to fruit and vegetables in this vicinity.

Kalamazoo, Kalamazoo county: great damage was done to crops in lowlands by the frost on the morning of the 29th.

New Hampshire.—Antrim, Hillsborough county: the frosts of the 29th and 30th were the severest occurring at so late a date for several years; heavy damage was sustained by farmers.

Hanover, Grafton county: the ground froze hard during the night of the 30–31st; early fruit was seriously injured.

Dover, Strafford county: nearly all of the corn, potatoes, and other crops were killed by the frost of the 30th.

Petersborough, Hillsborough county: the severe frost on the morning of the 30th killed fruit and all early vegetables.

Keene, Cheshire county: the frost on the night of the 29–30th destroyed a large per cent. of the early potatoes and corn.

New Jersey.—Cape May: the crops throughout this section are reported to have been much injured by the cold weather of the 29th and 30th.

New York.—Cooperstown, Otsego county: severe frosts occurred on the mornings of the 29th, 30th, and 31st, the temperature falling to 28°.

Menand Station (near Albany): the frost of the 30th was the severest known to occur in May for the last forty years; fruit and vegetables in many localities were entirely destroyed.

Rochester: a destructive frost occurred on the 30th; great damage was done to the tomatoes, fruit, and young corn in the adjoining counties.

Albany: the frosts of the 29th and 30th were destructive to vegetation.

Minetto, Oswego county: a severe frost, killing corn and potatoes, occurred on the 30th.

Demster, Oswego county: it is estimated that one-third of the strawberry crop in this locality was destroyed by the frost of the 30th.

Troy, Rensselaer county: the heavy frost on the morning of the 30th injured fruit and vegetables; in some localities ice formed to a thickness of three-fourths of an inch.

Poughkeepsie: on the morning of the 30th the thermometer fell to 25°. In Dutchess and Ulster counties the grape crop was fully one-half destroyed, the damage being estimated at more than $100,000.

Port Jervis, Orange county: a heavy frost occurred throughout this section on the morning of the 30th; the grape vines and fruit trees in many cases were ruined.

Montgomery, Orange county: thick ice formed on the lowlands on the morning of the 30th.

Attica, Wyoming county: the frost on the morning of the 29th caused considerable damage to early vegetables.

Ellicottsville, Cattaraugus county: the frost on the 29th caused great damage to the fruit crops.

Wellsville, Allegheny county: corn and potatoes were badly damaged by the frost on the night of the 28–29th.

Fredonia, Chatauqua county: young vegetation suffered serious injury by the cold weather of the 29th.

Sag Harbor, Long Island: the heavy frost on the night of the 29–30th, caused much damage throughout the island. The damage to the strawberry crop is estimated at $50,000. All of the ponds were covered with thin ice.

Ohio.—Columbus: the heavy frost on the 29th caused slight injury to tender plants.

Sandusky: a damaging frost occurred on the 29th.

Upper Sandusky, Wyandot county: a heavy frost occurred on the morning of the 29th, causing much damage to crops.

Massillon, Stark county: the severe frost on the 29th did great damage to crops in this section,

Findlay, Hancock county: a severe frost occurred on the 29th which damaged the corn crop and killed early vegetables.

Lima, Allen county: the frost of the 29th damaged small fruit and early vegetables.

Coshocton, Coshocton county: a heavy frost, causing considerable damage to fruit and vegetables, occurred on the morning of the 29th.

Province of Ontario.—Toronto: the frost on the night of the 29–30th caused a large amount of damage throughout Canada.

Pennsylvania.—Quakertown, Bucks county: frosts occurred on the 12th, 18th, 29th and 30th, which injured garden vegetables, etc.

Grampian Hills, Clearfield county: the frosts on the 29th and 30th caused injury to fruit and other vegetation.

Wellsborough, Tioga county: the frosts of the 29th and 30th were very destructive; fruit and vegetables were entirely destroyed and growing grain was materially injured; the temperature fell to 26° on the 30th; the damage in this county is estimated at from $10,000 to $15,000.

Dyberry, Wayne county: much injury was done by the frosts of the 29th and 30th.

Pittsburg: fruit and vegetables in eastern Ohio and western Pennsylvania were severely damaged by the frosts on the 29th and 30th.

Rhode Island.—Narragansett Pier: farmers in this vicinity report heavy damage to corn and vegetables by the frost of the 30th.

Point Judith: heavy frost occurred on the 30th; minimum temperature, 33°.8; much damage to crops.

Pawtucket: a heavy frost occurred along the Blackstone river on the morning of the 30th: ice formed to a thickness of one-half inch; fruit and vegetables were badly damaged.

Providence: the frost of the 30th caused serious damage to crops in this state.

Vermont.—Woodstock, Windsor county: the temperature fell to 25° on the morning of the 31st; all garden vegetables were killed; the ground froze to a depth of one inch.

West Virginia.—Helvetia, Randolph county: the frost on the 29th and 30th damaged corn, potatoes, and other vegetables.

Wisconsin.—Milwaukee: a destructive frost occurred on the 29th; potatoes and other vegetables were killed and the fruit crop was seriously injured.

Elkhorn, Walworth county: early vegetables were damaged by the frost on the 29th, but the fruit crop sustained no material injury.

Janesville, Rock county: the heavy frosts on the mornings of the 16th and 30th caused great damage to fruit and crops in the lowlands of this region.

Fort Atkinson, Jefferson county: a severe frost occurred on the 30th, but no serious damage resulted in this locality.

Palmyra, Jefferson county: a heavy frost, killing all early vegetation, occurred during the night of the 15th–16th.

Darlington, La Fayette county: the frost of the 29th was very severe in this locality; fruit and vegetables were badly damaged.

White Water, Walworth county: the frost on the night of 28–29th damaged the corn, barley and potato crops; all vegetables in lowlands were destroyed.

ICE.

Ice formed during May as follows:

Connecticut.—Bethel and Southington, 30th; one-half inch thick.

Indiana.—Wabash, 29th.

Iowa.—Guttenberg, 29th.

Maine.—Portland, 7th, 29th; Gardiner, 17th, 31st; Eastport, 30th.

Massachusetts.—Dudley, 29th, Heath, and Rowe, 29th, 30th, 31st; Fall River, 30th; Cambridge, 31st.

Michigan.—Detroit, 29th; Port Huron, 29th.

Nebraska.—Clear Creek, 2d.

New Jersey.—Readington, 29th.

New York.—Dannemora, 28th, 29th; Humphrey, and Buffalo, 29th; Albany, and Menand Station (near Albany), 30th, one half inch thick.

Ohio.—Columbus, Cleveland, Wauseon, and Garrettsville, 29th.

Pennsylvania.—Easton, and Pittsburg, 29th; Dyberry, and Grampian Hills, 29th, 30th; State College, and Wellsboro', 30th.

Rhode Island.—Block Island, Narragansett Pier, and Point Judith, 30th.

Vermont.—Strafford, 15th, 29th, 30th.

Wisconsin.—Milwaukee, 29th, from one-eighth to one-fourth inch thick.

PRECIPITATION.

[*Expressed in inches and hundredths.*]

The distribution of rainfall over the United states and Canada, for May, 1884, as determined from the reports of nearly eight hundred stations, is exhibited on chart iii.

In the first column of the following table is shown the average precipitation for May in each of the various districts, for several years, as determined from observations made at the Signal Service stations; in the second column are given the averages for May, 1884; and the third column shows the excess or deficiency of May, 1885, as compared with the average:

Average precipitation for May, 1884.

Districts.	Average for May. Signal-Service observations.		Comparison of May, 1884, with the average for several years.
	For several years.	For 1884.	
	Inches.	*Inches*	*Inches.*
New England	3.61	4.39	0.78 excess.
Middle Atlantic states	2.77	2.31	0.46 deficiency.
South Atlantic states	3.42	2.83	0.59 deficiency.
Florida peninsula	3.63	2.55	1.08 deficiency.
Eastern Gulf states	4.83	5.14	0.31 excess.
Western Gulf states	5.03	9.40	4.37 excess.
Rio Grande valley	2.68	5.50	2.82 excess.
Tennessee	3.84	3.62	0.22 deficiency.
Ohio valley	3.60	4.66	1.06 excess.
Lower lake region	3.10	3.14	0.04 excess.
Upper lake region	3.60	3.00	0.60 deficiency.
Extreme northwest	3.35	2.14	1.21 deficiency.
Upper Mississippi valley	4.62	3.46	1.16 deficiency.
Missouri valley	4.46	2.59	1.87 deficiency.
Northern slope	2.90	1.80	1.10 deficiency.
Middle slope	4.28	5.13	0.85 excess.
Southern slope	2.01	5.41	3.40 excess.
Southern plateau	0.29	0.66	0.37 excess.
Northern plateau	1.38	0.70	0.68 deficiency.
North Pacific coast region	2.37	1.22	1.15 deficiency.
Middle Pacific coast region	0.99	0.16	0.83 deficiency.
South Pacific coast region	0.29	1.00	0.71 excess.
Mount Washington, N. H.	4.36	9.54	5.18 excess.
Pike's Peak, Colo	3.61	2.90	0.71 deficiency.
Salt Lake City, Utah	2.40	1.78	0.62 deficiency.

The precipitation for May, 1884, exceeded the average in New England, the Ohio valley, middle slope, and over the southern part of the country from the Gulf states westward to the Pacific coast. In the western Gulf states and Rio Grande valley, the monthly precipitation was nearly double the May average, and in the southern slope it was nearly three times as great as the average; in the lower lake region it was normal; on the Atlantic coast south of New England, in Tennessee, and in the northern districts, from the upper Mississippi valley and upper lake region, westward to the Pacific coast it was below the average, the deficiencies ranging from 1.10 to 1.87 from Illinois and Missouri northwestward to Minnesota, Dakota, and Montana; in the northern plateau, north and middle Pacific coast regions it was less than one-half the average amount for May.

Table of excessive and greatest monthly precipitation.—May, 1884.

Station.	Specially heavy.		Largest monthly.	Station.	Specially heavy.		Largest monthly.
	Date.	Amt.	Amount.		Date.	Amt.	Amount.
Alabama.				*Missouri.*			
Mobile	4, 5	2.20	8.48	Pierce City	13	3.50	
Do	25, 26	2.96		*Nebraska.*			
Arkansas.				Fort Robinson	21	2.00	
Mount Ida	1	2.50	10.25	*New Hampshire.*			
Do	20	2.25		Mt. Washington	20, 21	3.17	9.54
Texarkana	2	2.46	7.49	*New Jersey.*			
Do	19, 20	3.65		Sandy Hook	6, 7	2.01	
Little Rock	3, 4	2.25	7.37	South Orange	10	2.25	
Prescott	3	4.00	6.28	*New Mexico.*			
Lead Hill	1	2.69		Fort Union	31	2.85	
Pine Bluff	14, 15	4.05		*New York.*			
Madison	22	2.50		Dannemora			6.62
Colorado.				New York City	6, 7	2.20	
West Las Animas	23	2.12		Fort Columbus	8	2.08	
Connecticut.				David's Island	8	2.28	
New London	6, 7	2.19		*North Carolina.*			
Dakota.				Charlotte	17	2.17	
Webster	21	4.01	9.19	*Ohio.*			
Do	23	2.95		Sidney			6.27
Fort Meade	19, 20	3.17	8.58	Canal Dover	27	2.15	
Florida.				*Pennsylvania.*			
Fort Barrancas	5	8.15	9.75	Wellsborough	6	2.60?	9.36?
Pensacola	4, 5	4.01	6.64	Do	20	2.16?	
Waldo			6.55	Do	27	2.89?	
Jacksonville	29	2.02		Blooming Grove	28	2.00	
Illinois.				*Rhode Island.*			
Greenville			7.89	Block Island	6, 7, 8	4.57	6.39
Mascoutah			7.70	Point Judith	7, 8	2.04	
Swanwick	1	2.03		Narragansett Pier	7, 8	2.38	
Peoria	12	2.25		*South Carolina.*			
Indiana.				Chester	25	2.01	
Laconia	4	2.10		Florence	25	2.99	
Indian Territory.				Yemassee	25, 26	3.90	
Cantonment	29, 30	4.05	6.95	*Tennessee.*			
Fort Reno	15	2.90	6.97	Trenton			8.64
Kansas.				Bolivar			7.16
Allison	22	2.86	9.04	Memphis			6.46
Fort Scott	1	2.75	9.03	Milan	4	3.58	
Do	18	4.89		Brownsville	4, 5	3.02	
Sherlock	29	2.02	7.94	*Texas.*			
Elk Falls	20	2.50		Weatherford	1	4.00?	27.94?
Kentucky.				Do	3	3.99?	
Louisville	4	2.10		Do	14, 15, 16	7.11?	
Louisiana.				Do	20, 21	12.85?	
Shreveport	3, 4	3.47	14.47	Tyler	3	4.00	17.47
Do	21, 22	7.62		Do	21, 22	8.00	
Grand Coteau	5	2.50	14.03	Palestine	1, 2, 3	6.62	17.25
Do	13	3.37		Do	20, 21, 22	7.55	
Do	20	2.06		New Ulm	3	4.40	15.25
Do	22	2.31		Do	22	2.19	
Whiteville	18	2.18	11.34	Huntsville	1	2.15	13.65
Do	22	2.15		Do	3, 4	2.65	
Do	25, 26	2.34		Do	21 to 24	7.37	
Minden	3	2.27	9.64	Fort Concho	20, 21	3.14	13.50
Do	21, 22	4.75		Do	26, 27	5.25	
Monroe	22	2.94	9.59	Barnesville	16	2.50	
Cheneyville			8.75	Do	21	3.00	
Natchitoches	22	2.03	8.67	Do	22	3.00	
Opelousas			8.29	Waco	21, 22	5.13	9.66
Alexandria	16	2.15	7.28	Clarkesville	1	2.70	9.53
Maine.				Do	21	3.02	
Eastport	8, 9	2.14	6.79	Paris	1	2.20	8.80
Portland	20, 21	1.96	6.46	Do	3	2.01	
Maryland.				Do	21	2.09	
Emmitsburg	7	2.25	7.19	Galveston	3, 4	2.31	8.42
Do	14	2.00		Dallas	20, 21	4.91	8.25
Massachusetts.				Indianola	3, 4	3.76	7.94
Fall River	8	2.00		Do	22	2.03	
Minnesota.				Austin	1	2.32	7.85
Duluth	21, 22	4.02		Cuero	3	3.39	6.89
Mississippi.				Honey Grove	21	2.50	6.80
Brookhaven	5	2.32	11.83	Fort Elliott	29	2.75	6.29
Do	14, 15	2.77		Fort Stockton	7	2.69	
Do	24	2.10		Rio Grande	19	2.00	
Vicksburg	2	2.40	11.76	Cleburne	21	2.09	
Do	20	2.11		*Vermont.*			
Edwards	2	3.80	9.84	Newport			6.79
Natchez	2	2.02	7.63	*Washington Territ'y*			
Lake			7.08	Neah Bay	2 to 6	5.60	6.30
Jackson	2	2.71	6.08				
Hernando	4	2.62					

Table of smallest monthly precipitation May, 1884.

Station.	Amt.	Station.	Amt.
Alabama.		*California*—Continued.	
Birmingham	0.42	Spadra	0.55
Auburn	0.61	Galt	0.58
Opelika	0.63	Summit	0.60
Eufaula	0.91	Hollister	0.62
Arizona.		Turlock	0.73
Benson	0.00	Salinas City	0.75
Tucson	0.00	Needles	0.75
Casa Grande	0.00	Auburn	0.85
Willcox	0.00	Merced	0.86
Maricopa	0.01	*Dakota.*	
Phœnix	0.01	Fort Buford	0.14
Fort Bowie	0.23	Fort Sully	0.36
Texas Hill	0.25	Fort Hale	0.46
San Carlos	0.32	Fort Yates	0.62
Pantano	0.33	Fort Totten	0.98
San Simon	0.34	*Delaware.*	
Yuma	0.44	Delaware Breakwater	0.88
Fort McDowell	0.45	*Florida.*	
Fort Thomas	0.60	Key West	0.35
Wickenburg	0.64	*Georgia.*	
Fort Verde	0.72	Eastman	0.02
Fort Grant	0.81	Bainbridge	0.24
California.		Columbus	0.50
Menlo Park	0.00	Jessup	0.69
Rocklin	0.00	Quitman	0.80
Cisco	0.00	Athens	0.82
Mojave	0.00	West Point	0.97
Knight's Landing	0.00	*Idaho.*	
Antioch	0.00	Lewiston	0.50
Marysville	0.00	Cœur d'Alene	0.66
Martinez	0.00	Boisé City	0.92
Woodland	0.00	*Mississippi.*	
Byron	0.00	Okolona	0.31?
South Vallejo	0.00	Meridian	0.55?
Davis	0.00	*Missouri.*	
Redding	0.00	Harrisonville	0.75
Brentwood	trace	Phelps City	0.90
Princeton	0.05	Pleasant Hill	0.91
San Jose	0.05	*Montana.*	
Pleasanton	0.05	Helena	0.63
San Mateo	0.05	Fort Shaw	0.74
Sacramento	0.06	Fort Maginnis	0.76
Truckee	0.06	Poplar River	0.78
Benicia Barracks	0.10	*Nevada.*	
Tracy	0.10	Reno	0.00
Santa Cruz	0.11	Humboldt	0.06
Willows	0.12	Hot Springs	0.09
Angel Island	0.12	Brown's	0.11
Napa	0.13	Wadsworth	0.27
Presidio of S. F.	0.14	Carson City	0.29
Modesto	0.15	Otego	0.46
Loma Prieta	0.16	Toano	0.55
College City	0.17	Elko	0.65
Niles	0.18	*New Jersey.*	
Mammoth Tank	0.19	Barnegat City	0.79
Alcatras Island	0.20	Little Egg Harbor	0.97
Livermore	0.20	*New Mexico.*	
Ravenna	0.20	Deming	0.00
Orland	0.23	Fort Craig	0.19
San Francisco	0.23	*Oregon.*	
Brighton	0.25	East Portland	0.09
Boca	0.30	Eola	0.42
Suisun	0.30	Bandon	0.53
Petaluma	0.31	Fort Klamath	0.74
Stockton	0.31	Roseburg	0.85
Pajaro	0.32	Albany	0.89
Cape Mendocino	0.33	*South Carolina.*	
Gilroy	0.34	Jacksonborough	0.96
Farmington	0.35	*Virginia.*	
Monterey	3.35	Cape Henry	0.78
Lathrop	0.36	*Utah.*	
Los Angeles	0.39	Kelton	0.81
Chico	0.40	*Washington Territory.*	
Fort Bidwell	0.40	Fort Spokane	0.00
Lemoore	0.40	Ainsworth	0.07
Calistoga	0.42	Pleasant Grove	0.17
Indio	0.46	Bainbridge	0.55
Tulare	0.48	Spokane Falls	0.56
Daggett	0.49	Port Angeles	0.65
Alta	0.50	Dayton	0.81
Hydesville	0.50	Fort Townsend	0.97
Goshen	0.54	*Wisconsin.*	
Anaheim	0.54	Ripon	0.75
Oakland	0.55		

DEVIATIONS FROM AVERAGE PRECIPITATION.

The departures exhibited by the reports from the regular Signal Service stations are shown in the table of average precipitation for May, 1884.

The following notes in connection with this subject are reported by voluntary observers:

Arkansas.—Lead Hill, Boone county: monthly precipitation, 5.93, is 3.43 below the May average of the two preceding years.

California.—The following extract is taken from the "Alta California" of May 21st: "Merced, Merced county: the precipitation for the rainy season of 1883–4, is 20.37, which is by far the largest that has occurred since the settlement of this county—at least since observations were noted."

Connecticut.—Hartford: monthly precipitation, 3.36, is 0.04 below the May average.

Illinois.—Riley, McHenry county: monthly precipitation, 2.56, is 0.90 below the May average of the last twenty-three years.

Swanwick, Perry county: monthly precipitation, 4.84, is 0.71 above the May average of the three preceding years.

Anna, Union county: monthly precipitation, 4.90, is 0.79 below the May average of the last nine years.

Indiana.—Lafayette, Tippecanoe county: monthly precipitation, 3.31, is 2.24 below the May average of the four preceding years.

Vevay, Switzerland county: monthly precipitation, 5.17, is 1.64 in excess of the May average for the last fifteen years.

Logansport, Cass county: monthly precipitation, 3.42, is 0.76 below the May average of the last five years.

Wabash, Wabash county: monthly precipitation, 4.69, is 0.43 above the May average of the last eight years.

Kansas.—Independence, Montgomery county: monthly precipitation, 1.27, is 3.10 below the May average of the last twelve years.

Wellington, Sumner county: monthly precipitation, 4.79, is 0.68 below the May average of the last six years.

Lawrence, Douglas county: monthly precipitation, 3.57, is 0.72 below the May average of the last seventeen years.

Maine.—Gardiner, Kennebec county: monthly precipitation, 4.00, is 0.30 above the May average of a period of forty-eight years.

Maryland.—Fallston, Harford county: monthly precipitation, 3.86, is 0.95 above the May average of the last thirteen years.

Massachusetts.—Worcester, Worcester county: monthly precipitation, 2.50, is 1.84 below the May average of forty-five years. The total precipitation for the first five months of 1884, is 22.03 or 3.01 above the average for the corresponding period of the last forty-five years.

Missouri.—Saint Louis: monthly precipitation, 2.49, is 2.23 below the May average.

New York.—Palermo, Oswego county: monthly precipitation, 1.28, is 1.40 below the May average of the last thirty-one years.

Dannemora, Clinton county: monthly precipitation, 6.62, is 2.69 above the May average of the four preceding years.

Ohio.—Wauseon, Fulton county: monthly precipitation, 3.95, is 0.03 below the May average of the last twelve years. The largest May precipitation of that period, 6.25, occurred in 1880; the smallest 1.14 occurred in 1877.

Pennsylvania.—Dyberry, Wayne county: monthly precipitation, 3.86, is 1.69 above the May average of the last fourteen years. The largest May precipitation of that period, 5.19, occurred in 1882; the smallest, 0.36, occurred in 1875.

Texas.—New Ulm, Austin county: monthly precipitation, 15.25, is 9.10 in excess of the May average for the last twelve years, and is the largest May precipitation of that period; the smallest, 2.94, occurred in 1874.

Vermont.—Woodstock, Windsor county: monthly precipitation, 3.90, is 0.19 above the May average of the last fifteen years.

Virginia.—Wytheville, Wythe county: the precipitation for the first five months of 1884 is 5.92 in excess of the average for the corresponding period of the last twenty-one years.

Variety Mills, Nelson county: monthly precipitation, 2.94, is 0.47 above the May average of the last five years.

West Virginia.—Helvetia, Randolph county: monthly precipitation, 4.57, is 0.09 above the average of the last eight years.

SNOW.

Snow is reported to have fallen in the various states and territories, as follows:

Arizona.—Prescott, 1st. Fort Grant: a light fall of snow occurred in the upper part of the Pinaleno mountains on the 21st.

Colorado.—Denver, 1st; West Las Animas, Pueblo, and Fort Lyon, 2d; Fort Lewis, 1st, 2d, 4th, 14th; Pike's Peak, 1st, 2d, 6th, 7th, 10th, 12th to 16th, 19th to 30th.

Dakota.—Deadwood, 4th, 12th.

Kansas.—Westmoreland, 1st; Allison, 5th.

Maine.—Portland, 8th, 12th, 30th; Eastport, 12th; Bangor and Cornish, 30th.

Michigan.—Alpena and Fort Brady, 2d, 15th; Escanaba and Marquette, 2d.

Minnesota.—Moorehead, 1st.

Montana.—Fort Maginnis, 1st, 3d; Fort Ellis, 4th.

New Hampshire.—Mount Washington, 7th, 8th, 10th to 18th, 30th.

New Mexico.—Fort Union, 1st, 2d.

New York.—Oswego, 6th; Dannemora and Rochester, 16th; Humphrey, 29th, 30th.

Pennsylvania.—Grampian Hills, 3d, 15th, 17th; Catawissa and Wellsboro, 29th, 30th; Dyberry, 30th.

Vermont.—Lunenburg, 8th, 17th, 30th; Strafford, 15th; Burlington, 16th.

Wisconsin.—Milwaukee, 2d.

Wyoming.—Cheyenne, 1st, 4th, 12th, 13th; Forts Bridger and Fred Steele, 4th.

Mr. Barrand de Montford, of Dannemora, Clinton county, New York, furnishes the following meteorological data for May 16th, with the dates of snow storms occurring during May in former years:

Light sprinkling of snow from 4.20 to 5.15 a. m.; at 7 a. m., temperature 46°, wind e., of force 3, cloudy; 8.30 a. m., wind veered to nnw., and 9.10 a. m., snow began to fall, wind nw., temperature 41°; 10 a. m., storm continued to increase, snow falling heavilyand temperature falling; noon, temperature 39°, wind nw., moving furiously: snow ceased at 2.30 p. m., wind nnw., of force 5, temperature 38°; amount of snow-fall (melted) during the storm 0.34 inch. Since 1866 snow has fallen at this place during May as follows: 1866, May 25th, covering the ground to a depth of one inch; 1872, May 3d, heavy snow storm, fair sleighing; 1876, May 1st, snow, hail, and sleet; 1882, May 2d, light snow.

MONTHLY SNOW-FALLS.

[*Expressed in inches and tenths.*]

The following monthly snow-falls have been reported from the various states and territories during the month:

Arizona.—Prescott, 3.7.

California.—Summit, 2.0.

Colorado.—Pike's Peak, about 16.0.

Kansas.—Allison, 1.5.

Nevada.—Toano, 10.5; Otego, 8.0; Humboldt, 5.0.

New Hampshire.—Mount Washington, 18.8.

New York.—Dannemora, 3.4; Humphrey, 3.0.

Vermont.—Lunenburg, 2.0.

SNOW ON GROUND AT END OF MONTH.

[*Expressed in inches and tenths.*]

On the summit of Pike's Peak, Colorado, 54.0.

On the summit of Mount Washington, New Hampshire, trace.

SLEET.

Pike's Peak, Colorado, 11th, 12th, 15th, 17th, 19th to 22d, 27th, 29th, 30th, 31st.

Eastport, Maine, 12th.

Conception, Missouri, 1st.

Mount Washington, New Hampshire, 14th.

Salt Lake City, Utah, 4th.

Milwaukee, Wisconsin, 2d.

HAIL.

Arkansas.—Little Rock: a damaging hail storm occurred at this place on the afternoon of the 5th.

Georgia.—Tallulah, Rabun county: one of the most violent hail storms ever experienced in northeast Georgia occurred in this county on the 21st. The hailstones were as large as hen's eggs, and in some places accumulated to a depth of twelve inches. The wheat and oat crops were completely ruined and trees were stripped of their foliage. The storm lasted about twenty minutes.

Illinois.—Litchfield, Montgomery county: at 4.30 p. m. of the 5th, a violent hail storm occurred. It came from the southeast and was of about fifteen minutes duration. Many of the hailstones weighed several ounces, but owing to the light force of the wind the damage was slight.

Cairo, Alexander county: a heavy storm of wind and hail occurred on the night of the 11–12th between this place and Malden, Dunklin county, Missouri. Much damage was done to wheat fields, trees and fencing. The railroads were obstructed by having trees, etc., blown upon the tracks.

Collinsville, Madison county: a hailstorm occurred on the 12th, which caused considerable injury to buildings and crops. The hailstones measured one and one-half inches in diameter.

Iowa.—Fort Madison, Lee county: the hail storm of the 12th caused considerable damage by breaking window glass.

Kansas.—Fort Leavenworth: the hail accompanying the storm of the 17th caused considerable damage to crops eight miles south of this place, and the railroad tracks were badly washed.

Leavenworth: during a thunder storm on the afternoon of the 17th, a heavy fall of hail causing considerable damage to fruit, occurred five miles south of this station.

Wyandotte, Wyandotte county: a severe hail storm occurred on the 17th, the hailstones measuring from three to five inches in circumference and causing much damage to windows, etc.

Massachusetts.—Fall River, numerous windows were broken by the hailstones on the 17th.

Missouri.—Marshall, Saline county: the eastern part of this county was visited by a very heavy wind and hail storm on the night of the 12–13th. At Slater the hail covered the ground to a depth of three inches and caused much damage.

New Mexico.—Fort Union: nearly four hundred panes of window glass in the post hospital were broken by the hailstones during a violent storm on the 31st.

South Carolina.—Greenville, Greenville county: a destructive hail storm occurred in the lower part of this county on the 19th. The path of the storm was one-half mile wide and fourteen miles long, extending from Grove station to Fountain Inn. Much damage was done to the growing crops by the hail, which covered the ground to the depth of three inches. A very violent hail storm also visited Laurens county on the 19th. In Young's township the farmers suffered heavy losses. The hail at some points is reported to have covered the ground to a depth of three feet, and did not disappear from the ground until noon of the following day. A substantial bridge over the Enosee river was swept away by the storm, and many out-buildings on the farms visited by the storm were blown down. Mr. W. P. Coker of Cedar Grove, Laurens county reports that a destructive wind and hail storm visited that section at about 4 p. m. of the 19th, destroying wheat, oats, and cotton. The hail stones fell to a great depth, and on the following morning they were found to cover the ground, in places, to a depth of eighteen inches. The storm passed south of this place, coming from the northwest, its path being from one-half to one mile wide. The wind blew with sufficient force to unroof buildings and prostrate trees.

Tennessee.—Nashville: a severe hail storm occurred at Jackson, Madison county, in this state, on the 4th, which caused considerable damage to the growing crops and to buildings.

Texas.—Fort Stockton: from 4.03 to 4.12 p. m. of the 2nd, a heavy fall of hail occurred.

Fort Concho: a severe hail storm occurred at 6.40 p. m. of the 6th, lasting thirty minutes.

Fort Elliott: a violent hail storm passed over this station in a direction from north to south, between 5.25 and 5.45 p. m. of the 25th. The hail stones were of remarkable size and caused much damage to buildings and live stock. The storm extended over a strip of country from ten to fifteen miles long and four miles wide. The principal damage caused was to buildings. At Mobeetie, a few miles southeast of this station, the hail stones perforated the sheet-iron roofs of the buildings.

The noise preceding the hail storm resembled that produced by the moving of a railway train.

Fort Davis: one of the severest rain and hail storms ever experienced in this vicinity occurred on the 25th. The storm began at 12.40 p. m. and continued for forty minutes. The hail stones varied in size from that of a hickory nut to five inches in circumference, and fell with such force as to perforate roofs of corrugated iron and tin. After the storm there were counted in the tin roof of the building in which the Signal office is located, seventy-nine holes, one inch square. Damage amounting to $5,000 was caused at this place. The storm came from the northeast and passed off the southwest.

Virginia.—Marion, Smyth county: a thunder storm occurred on the afternoon of the 19th, which was accompanied by hail measuring from one-fourth to one-half inch in diameter. It is reported that at points several miles south the hail storm was unusually severe, the hail stones being several inches in circumference.

Wytheville, Wythe county: on the afternoon of the 19th a violent wind and hail storm occurred. The hailstones were one inch in diameter and caused much damage to window glass.

Wisconsin.—Sussex, Waukesha county: a severe hail storm passed south of Waukesha at about noon of the 5th, its path being about two miles in width. The storm was of about ten minutes duration, the hail covering the ground to a depth of two inches.

Hail storms of less violence were reported from the different districts on the following dates:

New England.—7th, 8th, 10th, 11th, 16th, 17th, 20th.

Middle Atlantic states.—5th, 9th, 11th, 15th, 16th, 19th, 23d, 26th, 27th.

South Atlantic states.—14th, 19th, 25th, 27th, 28th.

Western Gulf states.—3d, 5th, 16th, 20th, 21st, 24th, 26th.

Rio Grande valley.—7th.

Tennessee.—2d, 3d.

Ohio valley.—4th, 5th, 18th, 19th, 26th, 27th.

Lower lake region.—1st, 6th, 9th, 11th, 15th, 16th, 27th.

Upper lake region.—1st.

Upper Mississippi valley.—5th, 12th, 17th, 18th, 22d, 31st.

Missouri valley.—4th, 5th, 12th, 17th, 18th, 19th, 21st, 31st.

Northern slope.—15th, 26th, 28th.

Middle slope.—4th, 11th, 12th, 15th, 16th, 17th, 20th to 23d, 26th to 31st.

Southern slope.—2d, 20th, 25th, 26th, 27th.

Southern plateau.—2d, 15th, 18th, 19th, 20th.

Middle plateau.—9th, 14th, 15th, 21st, 27th.

Northern plateau.—3d.

North Pacific coast region.—3d, 5th, 9th.

Table of rainy and cloudy days, relative humidity, and dew-point for May, 1884.

Districts.	Rainy days.	Cloudy days.	Rel. humidity.*	Dew-point.
			Percentages.	°
New England	From 9 to 17	From 3 to 12	From 65.1 to 84.5	From 38.8 to 48.1
Middle Atlantic states	" 7 " 14	" 4 " 8	" 59.0 " 87.1	" 44.6 " 65.5
South Atlantic states	" 5 " 13	" 3 " 7	" 59.4 " 80.6	" 54.7 " 66.2
Florida peninsula	" 4 " 8	" 0 " 3	" 69.6 " 72.2	" 67.1 " 69.7
East Gulf states	" 8 " 18	" 4 " 10	" 63.0 " 78.0	" 59.7 " 66.2
West Gulf states	" 8 " 15	" 4 " 11	" 68.6 " 81.8	" 56.2 " 68.7
Rio Grande valley	" 10 " 11	" 2 " 11	" 66.1 " 81.0	" 65.7 " 69.4
Ohio valley	" 11 " 15	" 4 " 10	" 62.0 " 65.2	" 47.6 " 57.2
Tennessee	" 9 " 12	" 2 " 7	" 65.5 " 66.9	" 53.7 " 55.8
Lower lake region	" 10 " 17	" 5 " 12	" 61.3 " 75.0	" 42.9 " 47.8
Upper lake region	" 9 " 19	" 5 " 10	" 65.5 " 73.1	" 35.9 " 44.4
Extreme northwest	" 2 " 6	" 2 " 7	" 57.9 " 69.3	" 39.0 " 42.6
Upper Mississippi valley	" 9 " 16	" 4 " 13	" 59.2 " 69.9	" 42.6 " 55.3
Missouri valley	" 10 " 13	" 5 " 8	" 64.3 " 69.4	" 42.9 " 50.5
Northern slope	" 6 " 16	" 3 " 10	" 50.4 " 68.8	" 31.7 " 46.4
Middle slope	" 10 " 19	" 7 " 9	" 57.5 " 66.9	" 37.2 " 47.1
Southern slope	" 5 " 15	" 3 " 5	" 50.9 " 72.5	" 42.0 " 56.7
Southern plateau	" 0 " 7	" 1 " 2	" 26.7 " 56.8	" 28.6 " 40.7
Northern plateau	" 3 " 11	" 1 " 5	" 55.8 " 65.4	" 42.4 " 48.8
North Pacific coast region	" 6 " 10	" 5 " 9	" 63.9 " 81.3	" 45.9 " 47.4
Middle Pacific coast region	" 2 " 5	" 3 " 7	" 58.2 " 84.5	" 47.3 " 53.1
South Pacific coast region	" 4 " 10	" 3 " 10	" 40.8 " 80.4	" 45.8 " 54.9
Mt. Washington, N. H.	Eighteen	One	94.2	30.4
Pike's Peak, Colo.	Twenty-two	Four	88.0	17.4
Salt Lake City, Utah	Eight	Six	50.9	38.3

* Relative humidity corrected for altitude.

COTTON REGION REPORTS.

In the table below are given the temperature and rainfall averages for the several districts for May, 1884, with the means for the same month in the two preceding years:

Temperature and rainfall data for the cotton districts, May.

Districts.	Rainfall.			Temperature.							
				Maximum.			Minimum.			Extremes for May, 1884.	
	Average for May of two preceding years.	Average for May, 1884.	Departures.	Mean for May of two preceding years.	Mean for May, 1884.	Departures.	Mean for May of two preceding years.	Mean for May, 1884.	Departures.	Max.	Min.
				°	°	°	°	°	°	°	°
New Orleans	4.76	9.20	+ 4.46	84.6	82.6	— 2.0	62.0	65.0	+ 3.0	99	45
Savannah	3.10	1.76	— 1.34	84.6	88.7	+ 4.1	60.1	65.4	+ 5.3	103	45
Charleston	3.80	2.70	— 1.10	82.3	86.0	+ 3.7	58.0	62.8	+ 4.8	95	40
Atlanta	2.48	1.57	— 0.91	79.8	83.9	+ 4.1	54.4	60.5	+ 4.1	97	46
Wilmington	2.42	3.26	+ 0.84	80.8	82.4	+ 1.6	54.6	59.0	+ 4.4	96	38
Memphis	6.08	3.77	— 2.31	79.0	80.5	+ 1.5	55.8	58.2	+ 2.4	93	41
Galveston	3.71	12.20	+ 8.49	85.2	82.9	— 2.3	63.0	61.5	— 1.5	94	43
Vicksburg	4.83	8.87	+ 4.04	82.3	81.9	— 0.4	60.1	62.0	+ 1.9	90	49
Montgomery	2.81	1.32	— 1.49	83.0	86.4	+ 3.4	57.1	60.5	+ 3.4	98	30?
Augusta	2.40	2.55	+ 0.15	82.8	85.6	+ 2.8	58.4	59.8	+ 1.4	100	40
Little Rock	7.64	5.59	— 1.05	80.3	79.4	— 0.9	54.1	58.2	+ 4.1	91	20?
Mobile	3.81	3.87	+ 0.06	84.3	85.6	+ 1.3	58.4	61.5	+ 3.1	98	49

WINDS.

The most frequent directions of the wind during May, 1884, are shown on chart ii. by arrows flying with the wind. On the Pacific coast the most frequent directions were from the northwest and west; over the northern slope and northern plateau, from northwest to southwest; in the western Gulf states and southern slope, southerly; in the lower Missouri valley, northerly; in the lake region and upper Mississippi valley, variable; on the Atlantic coast, from the south and southwest.

HIGH WINDS.

On the summit of Pike's Peak, Colorado, the highest wind velocity was 70, n., 5th; other dates on which velocities of fifty or more miles per hour were reported are as follows: 4th, 6th, 14th, 17th, 30th.

On the summit of Mount Washington, New Hampshire, the highest wind velocities were: 100, w., 2d; 96, nw., 3d; 78, nw., 4th; other dates on which velocities of fifty or more miles per hour were recorded are as follows: 1st, 5th, 7th, 8th, 10th, 14th, 16th, 17th, 18th, 19th, 20th, 21st, 23d, 24th, 25th.

Other stations reporting velocities of fifty or more miles per hour are as follows:

Cape Mendocino, California, 62, se., 25th.
Rochester, New York, 60, w., 2d.
Buffalo, New York, 58, sw., 2d.
Fort Canby, Washington Territory, 50, s., 4th.
Dodge City, Kansas, 52, w., 5th.

TOTAL MOVEMENTS OF THE AIR.

[*In miles.*]

In the following table are given the stations reporting the largest and smallest total movements of the air in each of the various districts:

Districts.	Stations reporting largest.	Miles.	Stations reporting smallest.	Miles.
New England	Block Island, R. I.	10,607	Eastport, Maine	5,552
Middle Atlantic states	Sandy Hook, N. J.	11,246	Lynchburg, Va.	2,574
South Atlantic states	Fort Macon, N. C.	9,384	Charlotte, N. C.	3,575
Florida peninsula	Cedar Keys	7,006	Key West	5,897
Eastern Gulf states	Pensacola, Fla	5,344	Montgomery	3,801
Western Gulf states	Indianola, Tex.	9,343	Fort Smith, Ark	3,625
Rio Grande valley	Brownsville, Tex.	6,362	Rio Grande, Tex.	5,968
Tennessee	Nashville	5,028	Chattanooga	4,250
Ohio valley	Columbus, Ohio	5,417	Indianapolis, Ind.	4,275
Lower lake region	Sandusky, Ohio	9,738	Toledo, Ohio	1,890
Upper lake region	Milwaukee, Wis.	8,093	Marquette, Mich.	5,345
Extreme northwest	Moorhead, Minn	7,603	Bismarck, Dak	5,131
Upper Mississippi valley	Davenport, Iowa	6,190	Keokuk, Iowa	2,886
Missouri valley	Huron, Dakota	7,215	Leavenworth, Kans.	4,193
Northern slope	Cheyenne, Wyoming	7,749	Deadwood, Dak	3,856
Middle slope	Dodge City, Kan	9,423	Denver, Colo	4,964
Southern slope	Fort Stockton, Tex.	8,179	Fort Davis, Tex.	4,662
Southern plateau	Fort Grant, Arizona	5,658	El Paso, Tex	3,498
Northern plateau	Dayton, Wash. T.	4,535	Lewiston, Idaho	1,003
North Pacific coast region	Fort Canby, Wash T	6,717	Roseburg, Oregon	1,856
Middle Pacific coast region	Cape Mendocino, Cal.	12,607	Red Bluff, Cal.	5,004
South Pacific coast region	San Diego, Cal	4,275	Yuma, Ariz.	3,942

On the summits of Mount Washington, New Hampshire, and Pike's Peak, Colorado, the total movements of the air were 19,960 and 12,552 miles, respectively, the record at the first-named station being incomplete on account of the instrument being out of order.

LOCAL STORMS.

Connecticut.—New Haven: during a squall at 6.05 p. m. on the 2d (low area i.), the barge "The President" was capsized while off Bridgeport.

Hartford: at Berlin and Rocky Hill, in Hartford county, numerous buildings were unroofed during a storm on the 15th. No damage was caused at Hartford.

Florida.—Jacksonville: a severe rain and thunder-storm passed over this city in a direction from southeast to northwest between 3.05 and 4.30 p. m. of the 5th. Considerable damage was caused by lightning.

Pensacola: on the morning of the 25th, a whirl-wind, about fifty yards in diameter, passed through the city in a direction from southwest to northeast. Pieces of light scantling and other objects were carried within the vortex to a height of five hundred feet; the rotary motion was from right to left; some slight damage resulted.

Illinois.—Chicago: captains of vessels arriving at this port on the 2d state that one of the fiercest squalls of the season occurred on Lake Michigan during the night of the 1–2d (low area i.). It began at about 11 p. m., the wind backing from northeast to northwest and attaining an estimated velocity of sixty-five miles per hour. The squall was accompanied by torrents of rain intermingled with hail. There was a very high sea on the lake, and many craft had portions of their deck-loads washed overboard. Vessels bound southward were forced to return. The schooner "Higgie" which left this port for Buffalo, New York, on April 30th, with a cargo of 32,000 bushels of wheat, encountered the storm and was disabled and compelled to return, having had 10,000 bushels of her cargo of wheat damaged. The schooner "A. E. Vickery" went ashore during the storm on Middle island reef, about thirty miles above Alpena, and proved a total loss.

Rock Island, Rock Island county: at 4.30 p. m. of the 5th a violent storm passed over the southern part of this town. Three houses were demolished and numerous others were unroofed. All of the buildings and fences at the Fair grounds were blown down.

Quincy, Adams county: at 1.15 p. m. of the 18th a tornado struck Melrose township, four miles southeast of Quincy, and caused great damage to buildings and trees on the farms in that vicinity.

Decatur, Macon county: many shade trees and out buildings were blown down in the southern part of this town by the storm on the afternoon of the 18th.

Indiana.—Richmond, Wayne county: a storm passed north of this place during the night of the 1–2d, blowing down buildings, fences, and trees.

Iowa.—Davenport: at about 4.30 p. m. of the 5th a severe storm passed over this city from the southwest. The storm was most destructive in the western part of the city, where several buildings were unroofed or otherwise damaged.

Kansas.—Fort Scott, Bourbon county: a violent thunder storm, accompanied by a very heavy rainfall, occurred on the 1st a point one-half mile south of this town. Several buildings were damaged.

Sherlock, Finney county: a violent storm of hail and rain occurred on the afternoon of the 29th, during which out buildings were blown down and other damage caused. The rainfall was remarkably heavy, more than two inches of water having fallen in one hour.

Louisiana.—Shreveport: a violent rain storm prevailed during the night of the 21–22d, nearly five and one-half inches having fallen in eight hours. The storm was accompanied by terrific thunder and a remarkable electrical display. Many bridges in the surrounding country were washed away, and the roadways were badly damaged. Considerable damage was done by lightning.

Maine.—Portland: at 3.30 a.m. on the 8th, during a strong easterly gale, the steamer "City of Portland" was wrecked on Grindstone ledge, Penobscot bay; the vessel and cargo were a total loss.

Michigan.—Alpena: some slight damage to buildings was caused by the storm of the 16th.

Mississippi.—Vicksburg: a violent thunderstorm, accompanied by heavy rain and small hail, occurred on the afternoon of the 20th. Several small buildings were damaged at Delta, Louisiana, on the opposite side of the Mississippi river.

Missouri.—Rich Hill, Bates county: a very heavy rainstorm prevailed here on April 30th, and continued until noon of May 1st, when the wind shifted from southeast to northwest and blew with great force. Numerous buildings were damaged and nearly all the fencing in the surrounding country was blown down.

Nebraska.—Indianola, Red Willow county: on the afternoon of the 27th, just before the occurrence of a heavy rain and hail storm, a tornado cloud was witnessed by a number of citizens of McCook, about thirteen miles west of this place. When first observed it was moving eastward, but its course was afterwards changed to the northwest, and it finally lifted from the earth and disappeared.

New Hampshire.—Dover, Strafford county: a violent thunderstorm accompanied by an unusually heavy rainfall occurred on the morning of the 9th. Considerable damage was caused by lightning.

New York.—Oswego: a storm (low area i.) prevailed at this place from 10 a. m. until 5.50 p. m. of the 2d, the highest wind velocity, thirty-three miles, occurring at 1.05 p. m. This storm, although not especially severe in the vicinity of Oswego, proved very damaging to shipping interests on Lake Ontario. The schooners "George B. Sloan," "Mary Copeley" and "John T. North," lost sails, and the schooner "M. J. Cummings" was dismasted near Oakland.

Rochester: a severe storm (low area i.) set in at this place at 8.40 a. m. of the 2d, and continued until 5.30 p. m. of that date. This storm is considered to have been one of the severest that has ever occurred here. At 9.57 a. m., at which time the anemometer was broken, the wind blew at the rate of sixty miles per hour, and it is estimated that between 11 a. m. and noon it reached a velocity of from seventy to seventy-five miles from the southwest to west. The storm was of unusual severity throughout western New York, but it appears to have been most violent in Rochester and vicinity, where a very large amount of damage was done. In Orleans county, houses were unroofed and blown down. The telegraph and telephone poles in all directions were prostrated. At Charlotte, on Lake Ontario, the storm caused the roughest sea that has been observed for many years.

Buffalo: the severest storm (low area i.) that has occurred since the opening of lake navigation for this season occurred on the 2d. From 4.30 to 4.45 p. m. the wind blew at the rate of fifty-eight miles per hour. During the cautionary signal display more than fifty vessels remained in this port. A large number of chimneys and out-buildings were blown down during this storm.

Syracuse: the storm (low area i.) of the 2d caused considerable damage to buildings at this place.

Utica: during the storm on the afternoon of the 2d, numerous signs and awnings were blown down. At Auburn considerable damage was caused by this storm.

Ohio.—Findlay, Hancock county: a violent storm prevailed here during the night of the 1–2d, signs and trees were blown down; no serious damage resulted.

Province of Ontario.—Kingston: the schooner "Arcadian," lumber-laden from Toronto to Oswego, encountered a gale (low area i.) on the 2d, when thirty miles off Presqu' Isle, and had her foremast, maintopmast and foresail blown away. The schooner "Western," was also caught in the gale and had her bulwarks damaged.

Colchester: the scow "Gorman" was capsized during the storm (low area i.) of the 2d.

Belleville: the steam barge "Varcina" was struck by a violent squall (low area i.) on the 2d, while passing up Big bay, and had her life-boats washed away.

Tennessee.—Chattanooga: on the 2d a violent storm passed passed over Lookout monntain, near Sulphur Springs, Alabama, and about thirty miles south of Chattanooga. The track of the storm was about four hundred yards wide and everything in its course was destroyed. On the 24th a severe hail storm occurred at Boyce station, five miles northeast of Chattanooga. The storm began at 7 p. m. and continued for ten minutes; much damage was done to the fruit crop.

Texas.—Dallas, Dallas county: a violent storm prevailed at this place during the night of the 20–21st. The wind blew with a force sufficient to prostrate trees and fencing. The rainfall was remarkably heavy and flooded the lowlands. Of ten trains due at this place on the 21st, only one arrived.

Marshall, Harrison county, 5th: the recent heavy rains have been the most destructive to crops that have ever occurred in this section. Many farmers will have to replant their entire crops.

Hempstead, Waller county: on the morning of the 21st, a destructive tornado passed through this county near Howth's station. A house, within which were five persons, was blown down and one of the inmates killed.

Mexia, Limestone county: a storm of considerable force passed over the northeastern part of this town at 8 p. m. of the 21st. Reports state that a tornado occurred at about noon of the 20th between Fairfield and Stewartsville, in Freestone county.

El Paso: at 12.36 p. m. of the 27th a violent whirl-wind passed over this town, carrying with it a column of sand more than one hundred feet high. The diameter of the whirl was apparently from ten to fifteen feet, and its rotary motion from right to left. Its path was almost in a direct line from west-southwest to east-northeast, and in the vortex many light objects were carried to a height of about eighty feet. When the whirlwind reached a large shed in its course it became stationary for a short interval; the rotary motion increased in violence, tearing off a part of the sheet-iron roof and hurling it some distance. Several plates of sheet-iron of from seventy-five to one hundred square feet of surface were taken upward to a height of forty feet and carried a distance of one hundred feet. No unusual change was noted in the meteorological instruments during the passage of the whirl-wind.

Fort Stockton: during the early morning of the 30th a severe storm passed over this place, blowing down signs etc.

Vermont.—Burlington: one of the severest storms (low area i.) experienced here for many years occurred on the afternoon of the 2d. The water in Lake Champlain was very high, and during the storm 1,100 feet of the breakwater were torn away, entailing a loss of $35,000. The wharves were also damaged to the extent of $5,000.

Wisconsin.—Milwaukee: the storm (low area i.) of the 2d was reported by vessels arriving at this port to have been very severe on Lake Michigan. The wind blew with the force of a strong gale and was accompanied by heavy snow, sleet, and rain. A ship-captain stated that at one time the decks of his vessel were covered with six inches of snow. Numerous disasters occurred on the lake during the storm.

NAVIGATION.

STAGE OF WATER IN RIVERS.

The Ohio, Missouri and upper Mississippi rivers were low throughout the month. In the lower Mississippi the water continued to fall slowly, the decline for the month being three feet and nine inches at Vicksburg, Mississippi, and six inches at New Orleans, Louisiana.

The Red river at Shreveport, Louisiana, reached a very high stage on the 14th, at which time it was nearly three feet above the danger-line, and one inch above the flood-mark of February, 27, 1884.

The Cumberland river reached a very low stage during the latter part of the month: The observer at Nashville, Tennessee, reports that navigation was partially suspended on the 28th, on account of low water. During the last three years navigation in the Cumberland has continued until July, and last year the river was navigable until the latter part of August. At the close of May, 1884, only boats of light draft were able to make trips.

In the following table are shown the danger points at the various river stations; the highest and lowest stages for May, 1884, with the dates of occurrence; and the monthly ranges:

Heights of rivers above low-water mark, May, 1884.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:	Ft. In.		Ft. In.		Ft. In.	Ft. In.
Shreveport, Louisiana	29 9	14	32 8	1	21 1	11 7
Arkansas:						
Little Rock, Arkansas	33 0	16	23 9	31	9 3	14 6
Fort Smith, Arkansas	.....	4	16 3	31	0 2	16 1
Missouri:						
Yankton, Dakota	20 0	31	10 8	20,21,25	6 0	4 8
Omaha, Nebraska	16 0	31	8 11	21 to 24	7 0	1 11
Leavenworth, Kansas	21 0	31	13 5	22	10 2	3 3
Mississippi:						
Saint Paul, Minnesota	14 6	5, 6, 7	10 3	22	6 11	3 4
La Crosse, Wisconsin	18 0	11, 12	8 1	3, 5	5 9	2 4
Dubuque, Iowa	21 10	16	11 6	31	9 2	2 4
Davenport, Iowa	15 0	4, 19	8 10	31	6 10	2 0
Keokuk, Iowa	14 6	8, 9	10 4	31	7 9	2 7
Saint Louis, Missouri	30 0	7	25 2	28	17 4	7 10
Cairo, Illinois	40 0	9	38 5	31	21 4	17 1
Memphis, Tennessee	34 0	.....	.....	.....	.....	.....
Vicksburg, Mississippi	41 0	6 to 9	45 9	31	42 0	3 9
New Orleans, Louisiana *	—2 6	14, 15	— 1 5	1	— 1 11	0 6
Ohio:						
Pittsburg, Pennsylvania	20 0	16	7 0	4	2 9	4 3
Cincinnati, Ohio	50 0	16	22 5	31	12 7	9 10
Louisville, Kentucky	24 0	1	9 5	31	6 10	2 7
Cumberland:						
Nashville, Tennessee	42 0	1	16 11	31	3 7	13 4
Tennessee:						
Chattanooga, Tennessee	33 0	7	11 5	31	4 3	7 1
Monongahela:						
Pittsburg, Pennsylvania	29 0	16	7 0	4	2 9	4 3
Savannah:						
Augusta, Georgia	.....	7	9 10	31	6 8	3 2
Willamette:						
Portland, Oregon	.....	31	18 5	4	8 11	9 6
Sacramento:						
Red Bluff, California	.....	1	5 10	31	3 2	2 8
Sacramento, California	.....	1	22 10	31	22 0	0 10
Mobile:						
Mobile, Alabama	.....	27	17 0	18	15 9	1 3
Colorado:						
Yuma, Arizona	.....	31	26 2	1	18 8	7 6

* Below high-water mark of 1874 and 1883.

ICE IN RIVERS AND HARBORS.

Lake Superior.—Marquette, Michigan: harbor full of ice on 5th; ice moved out of harbor on 6th; ice in harbor on 21st and 31st.

Duluth, Minnesota: the ice was driven out of the harbor by westerly winds on the 1st, when navigation was resumed; the propeller "Osceola," left for Buffalo, being the first departure of the season; the harbor was covered with ice on the 4th; the first arrival of the season occurred on the 9th; there were large quantities of ice in the lake on the 12th and 13th; the lake was clear of ice on the 14th.

Minne-waukan, or Devil's lake.—Fort Totten, Dakota: the ice in the lake was gradually disappearing on the 6th; on the 11th, the lake was free of ice and navigation was resumed on that date.

Yellowstone River.—Fort Assinaboine, Montana: navigation open; first boat of the season arrived on the 4th.

FLOODS.

The floods which occurred during May were of local character and were confined to the smaller rivers and streams; they were most destructive in Texas, where a large amount of damage was done. The reports from the various states are as follows:

Arkansas.—Little Rock: on the 6th the streams in this vicinity were much swollen. Reports from points above this

city on the Arkansas river on that date stated that the water had nearly reached the greatest height of the recent flood marks. The Texas and Pacific railroad was badly damaged between Pine Bluff and Texarkana, and the running of trains to Camden, on the Iron mountain branch, was discontinued.

Helena: the heavy rains of the 5th and for several days preceding that date flooded the surrounding country to such an extent that farming operations were abandoned.

California.—Merced, Merced county, 20th: the melting of the winter's snowfall has caused all streams in this vicinity to overflow.

Colorado.—Denver: reports received at this place on the 31st stated that on the 29th a cattle "round-up" camp on Frenchman creek in Nebraska, near the line dividing that state and Colorado, had been destroyed by a flood, and that eleven of fifty herdsmen, encamped at that place, were drowned. During the evening of the last-mentioned date the creek rose rapidly, but no danger was apprehended. It is thought that a "cloud-burst" occurred about midnight at some distance up the creek, which caused it to overflow, when the water suddenly rushed down upon the camp, sweeping away the men, animals, and wagons. The flood soon began to recede and at daylight, the water had fallen to its usual height. The banks of the stream, for miles, were strewn with fragments of wagons, tents, etc.

Idaho.—Boisé City: the bridge over the Boisé river was damaged to the extent of $1,000 by the high stage of water on the 11th.

Louisiana.—Shreveport: on the 12th several large plantations in this region were overflowed. On the 14th the Red river was thirty-two feet, eight inches above low water mark. This stage is one inch higher than the maximum height of February 27th, 1884, and is said to be the highest point attained since 1849. The Signal Service observer at Shreveport reports that the acreage under cultivation is greater than for any previous year, and that this flood will prove by far the most destructive that has ever occurred in this region. Should the river now recede in time to permit cotton planting, great difficulty would be experienced in procuring the seed.

Mississippi.—Vicksburg: on the 9th, the steamer "City of Vicksburg" brought about two hundred laborers from the overflowed farms in Tensas parish, Louisiana. On this date it was estimated that sixty per cent. of the area of Madison parish and seventy per cent of Tensas parish were still under water.

Missouri.—Pierce city, Lawrence county: very heavy rains fell during the night of the 12–13th, flooding the creeks in this vicinity. The eastern part of the town was under water, and the railroad bridge, with about three hundred yards of the track on either side, was washed away.

Lexington, La Fayette county: reports from the surrounding country on the 18th stated that the rainfall on the afternoon of the 17th was the heaviest known for several years. The creeks were much swollen, Tabo creek having risen six feet in two hours. The Missouri Pacific railroad track was washed out, causing delay of trains.

Carthage, Jasper county: the heaviest rainfall of the season occurred during the night of 12–13th. All of the neighboring streams were much swollen and the lowlands were flooded. Trains were delayed on account of washouts on the railroads.

Nebraska.—Omaha: in Platte county, on the afternoon of the 5th, a violent hail storm occurred, which was followed by a remarkably heavy rainfall. It is reported that in three hours ten inches of rain fell, which flooded the country. The town of Columbus was completely isolated for three days, and a serious washout occurred on the railroad both east and west of Columbus. Nine miles north of Columbus two school children were caught in the storm and drowned. A mill on Lost creek was destroyed and a large number of cattle were drowned.

Humphrey, Platte county: the storm of the 5th, which passed ten miles south of this place, was one of unusual severity and was accompanied by a phenomenal rainfall. The water in Shell creek rose to the tops of the trees along its banks. Much property was destroyed and many head of cattle were drowned.

Genoa, Vance county: on the afternoon of the 5th, at about eight or ten miles northeast of this station, a "cloud-burst" occurred which drowned stock, washed away railroad tracks and bridges, and flooded the country for miles in extent.

Texas.—Galveston: reports from all portions of the state show the rains of the 20th and 21st, to have been the heaviest ever known in Texas, and that the damage to agricultural interests was very great. Travel on all railroads in eastern Texas was suspended on account of injury to the road beds and the washing away of bridges. Reports from Tyler, Marlin, Navasota, Crockett, Waverly, and other points in northeastern Texas, state that the heavy rains of the 21st flooded that region to a greater extent than has been known for many years. At Weatherford more than eight inches of rain fell; at Corsicana, five inches; at Dallas, Palestine, and Tyler, four inches. The north bound train on the International and Great Northern railroad, which left Galveston on the evening on the 21st, after passing Houston, was compelled to return on account of dangerous washouts in the road near Palestine. The overflowing of the Sabine river inundated many plantations in the adjacent lowlands. Reports from Waco on the 21st stated that the Brazos river reached the highest point that has been known for thirty years, and that a number of dwellings were surrounded by water compelling their occupants to abandon them. At Marlin, on the Brazos, many families were compelled to move out of their houses. On the 23d it was estimated that the actual damage to railroad property by the heavy rains of the 20th and 21st would be $2,000,000, and the combined losses sustained by farmers and railroad companies would reach $5,000,000. Hundreds of culverts and small bridges were washed away. Owing to the general suspension of railroad traffic, large quantities of freight accumulated at points along the several roads. A heavy rain storm set in on the night of the 24–25th. On the 26th reports from various parts of the state showed that washouts had occurred on all Texas railroads. The eastern approach of the Bremond narrow-gauge railroad bridge across the San Jacinto river was washed away, and the whole country in that vicinity was under water. Large numbers of cattle were drowned and the inhabitants were driven to the highlands.

Fort Worth, Tarrant county, 21st: the heavy rains of the past few days caused the streams in this vicinity to rise rapidly. The Trinity river overflowed on the 21st, inundating the bottom lands for a mile on either side of the river and washing away a number of small cabins. The water in Trinity river rose to a greater height than has been known since 1866. The overflow has damaged crops to a great extent. Railroad travel was seriously interrupted and much stock was drowned.

Corsicana: on the 23d, Chambers creek was one and one-half miles in width, and many of the farmers along its banks sustained heavy losses. Seven bridges, belonging to the county were washed away, entailing a loss of about $6,000.

Jefferson, Marion county, 23d: the heavy rains of the past few days have caused the streams to rise rapidly. Travel on both the Texas Pacific and Red river railroads was suspended on account of high water.

The Signal Service observer at El Paso, Texas, reports the following: "about the 10th, the Rio Grande river began to rise rapidly and latterly reached an unprecedented height, submerging the lowlands in the Rio Grande valley, and causing loss of life and great damage to property. Railroad travel north and east was seriously interfered with by washouts. At the close of the month the Southern Pacific railroad, southeast of El Paso, was in some places covered with water to a depth of three feet."

Rio Grande City: the rise in the Rio Grande river reached this place on the 26th, when the banks on the Texas side of the river began to give way.

Utah.—Salt Lake City, 31st: the rivers throughout the ter-

ritory have been much swollen during the month. At the close of the month the lowlands in the southern part of this city were flooded. At Ogden several dams were swept away, entailing losses estimated at $6,000. Numerous washouts occurred on the Union Pacific railroad. The Denver and Rio Grande railroad in southeastern Utah was flooded and no trains from Denver arrived after the 28th. The water in Great Salt Lake reached a greater height than has been known for many years.

Nephi, Juab county: the railroad bridge at the forks of Salt creek was washed away on the 9th.

West Virginia.—Wheeling: on the 13th the southeastern part of Jackson county, in this state, was visited by a severe storm which caused heavy losses to the farmers along the creek bottoms. Several dwellings and bridges and numerous barns are reported to have been washed away. The orchards and newly planted fields were also seriously damaged.

RAIN FROM A CLOUDLESS SKY.

Key West, Florida: from 9.45 to 10 p. m. of the 28th, a light rain fell when no cloud was visible except near the western horizon.

HIGH TIDES.

Eastport, Maine: 11th and 27th.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for May, 1884, with the telegraphic reports of the preceding twenty-four hours, shows the general average percentage of verifications to be 81.54 per cent. The percentages for the four elements are: Weather, 87.43; direction of the wind, 75.81; temperature, 79.52; barometer, 86.22 per cent. By geographical districts, they are: For New England, 79.66; middle Atlantic states, 84.35; south Atlantic states, 84.25; eastern Gulf, 83.93; western Gulf, 84.90; lower lakes, 79.92; upper lakes, 78.04; Ohio valley and Tennessee, 81.80; upper Mississippi valley, 78.35; Missouri valley, 78.65; north Pacific, 86.29; middle Pacific, 87.10; south Pacific, 89.52. There were three omissions to predict out of 3,137, or 0.09 per cent. Of the 3,134 predictions that have been made, seventy-eight, or 2.49 per cent., are considered to have entirely failed; one hundred and fifty-two, or 4.85 per cent., were one-fourth verified; four hundred and thirty-six, or 13.91 per cent., were one-half verified; six hundred and seventy-four, or 21.51 per cent., were three-fourths verified; 1,794, or 57.24 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During May, 1884, two hundred and sixty-six cautionary signals were ordered. Of these, one hundred and ninety-seven, or 74.06 per cent., were justified by winds of twenty-five miles or more per hour at or within one hundred miles of the station. Fifty-eight cautionary off-shore signals were ordered, of which number forty-six, or 79.31 per cent., were fully justified, both as to direction and velocity; forty-eight, or 82.76 per cent., were justified as to velocity; and forty-nine, or 84.48 per cent., were justified as to direction. Three hundred and twenty-four signals of all kinds were ordered, two hundred and forty-three, or 75.0 per cent., being fully justified. These do not include signals ordered at display stations where the velocity of the wind is only estimated. Of the above cautionary off-shore signals, fifty-four were changed from cautionary; no northwest signals were ordered. Five signals were ordered late. In eighty-seven cases winds of twenty-five miles or more per hour were reported for which no signals were ordered.

Prof. T. C. Mendenhall, director of the "Ohio Meteorological Bureau," in his report for May, 1884, makes the following statement:

In the matter of railway weather signals the percentage of verification for the month is: for temperature, 93; and for state of the weather, 78, the mean being 85.5. For May of last year the percentage of verification was reported as 75, and a gain of more than 10 per cent. is shown.

Arrangements are now nearly completed for placing the system of car signals upon the two divisions of the Hocking Valley and Columbus and Toledo Railway. It is expected to have the system in successful operation before the end of June, and efforts will be continued to secure permission to place the signals on the cars of other lines of railway.

TEMPERATURE OF WATER.

The temperature of water as observed in rivers and harbors during May, 1884, with the average depth at which the observations were made and the mean temperature of the air at the various stations, are given in the table below. The highest water temperatures, 86°.5 and 81°.3 were reported from Key West, Florida, and Savannah Georgia, and occurred on the 21st and 25th respectively, the lowest, 32°.9 occurred at Buffalo, New York, on the 2d. The smallest monthly range, 2°.9 occurred at Eastport, Maine; the greatest, 24°.1, occurred at Buffalo, New York. Observations were interrupted by ice at Duluth, Minnesota from the 1st to 11th, and at Marquette, Michigan on the 5th. On account of breakage of instruments no observations were made at San Francisco, California and Fort Canby, Washington Territory, from the 1st to 15th.

Temperature of water for May, 1884.

Station.	Temperature at bottom.		Range.	Average depth, feet and inches.		Mean temperature of the air at station.
	Max.	Min.				
	°	°	°	ft.	in.	°
Atlantic City, New Jersey	66.0	49.5	16.5	5	1	58.7
Alpena, Michigan	61.5	41.5	20.0	12	1	48.5
Augusta, Georgia	80.5	60.0	20.5	7	11	74.0
Baltimore, Maryland	68.3	57.4	11.1	9	7	64.8
Block Island, Rhode Island	56.0	44.9	11.1	8	8	55.0
Boston, Massachusetts	55.4	46.1	9.3	21	6	53.8
Buffalo, New York	57.0	32.9	24.1	10	...	52.1
Canby, Fort, Washington*	66.9	48.5	18.4	15	8	53.4
Cedar Keys, Florida	86.5	76.5	10.0	8	10	77.0
Charleston, South Carolina	80.2	68.7	11.5	42	8	74.8
Chicago, Illinois	55.8	46.3	9.5	8	7	56.7
Chincoteague, Virginia	76.9	56.7	20.2	4	3	61.7
Cleveland, Ohio	58.8	45.5	13.3	14	0	57.7
Detroit, Michigan	60.4	48.2	12.2	23	3	58.9
Delaware Breakwater, Delaware	67.0	48.7	18.3	9	5	60.0
Duluth, Minnesota*	41.2	38.5	2.7	4	1	46.9
Eastport, Maine	40.2	37.3	2.9	15	6	46.5
Escanaba, Michigan	55.1	34.9	20.2	17	11	49.1
Galveston, Texas	82.0	71.4	10.6	12	2	75.9
Grand Haven, Michigan	66.2	57.0	9.2	19	...	55.1
Indianola, Texas	82.0	66.9	15.1	9	1	75.4
Jacksonville, Florida	84.9	75.4	9.5	18	...	76.5
Key West, Florida	87.7	79.2	8.5	17	4	80.9
Mackinaw City, Michigan	51.8	37.0	14.8	10	...	47.7
Macon, Fort, North Carolina	77.0	62.5	14.5	6	8	64.3
Marquette, Michigan*	38.0	34.7	3.3	9	11	47.2
Milwaukee, Wisconsin	52.1	45.1	7.0	8	0	53.5
Mobile, Alabama	81.5	68.5	13.0	16	3	74.6
New Haven, Connecticut	62.2	49.2	13.0	15	8	55.9
New London, Connecticut	55.0	44.0	11.0	12	8	55.8
New York City	60.9	50.5	9.5	16	4	58.8
Norfolk, Virginia	75.4	61.6	13.8	16	10	68.1
Pensacola, Florida	77.3	71.1	6.2	17	5	74.2
Portland, Maine	50.9	42.5	8.4	16	7	53.9
Portland, Oregon	61.7	51.0	10.7	62	10	59.8
Sandusky, Ohio	65.0	54.0	11.0	11	2	59.6
Sandy Hook, New Jersey	56.8	47.3	9.5	1	6	58.9
San Francisco, California*	59.7	56.2	3.5	39	1	58.2
Savannah, Georgia	81.3	65.7	15.6	10	3	76.1
Smithville, North Carolina	78.0	66.8	11.2	11	1	71.5
Toledo, Ohio	69.2	56.2	13.0	12	0	59.8
Wilmington, North Carolina	77.6	62.8	14.8	19	0	71.5

* Reports incomplete; see text.

ATMOSPHERIC ELECTRICITY.

AURORAS.

The only auroral display of the month, observed at more than one place, was that which occurred during the early morning of the 1st; and it was only observed at a few of the more northerly stations between New Hampshire and Dakota, as will be seen from the following reports:

Mount Washington, New Hampshire: a faint auroral display was observed from 1.30 a. m. of the 1st until daylight; it consisted of indistinct streamers extending upward 50°; no arch was visible.

Boston, Massachusetts: from 2 a. m. until daylight of the 1st, was observed a very brilliant auroral display in the form of an arch with streamers of light red color. The arch extended over about 40° of the northern sky and to an altitude of 45°.

During the day there was a peculiar arrangement of clouds, indicating the continuance of the aurora; at dusk the auroral light was again visible and continued until 11 p. m., but it was much less brilliant than the display of the early morning.

Wauseon, Ohio: a moderately bright aurora, consisting of streamers reaching an altitude of 30°, was observed from 12.30 to 2 a. m. of the 1st.

Bismarck, Dakota: aurora observed from 1.26 a. m. until daylight on the 1st. No beams were visible.

The other displays are as follows:

Fort Macon, North Carolina: a faint auroral display was observed from 11.30 to 11.50 p. m. of the 15th; it appeared above a bank of dark clouds and extended about 45° above the horizon. The telegraph lines were slightly affected by the display.

Fremont, Nebraska: dim aurora on the 7th.

Vevay, Indiana, 28th: faint aurora at 8 p. m.

Voluntary observers at Logansport, Indiana, and Embarras, Wisconsin, report auroral displays, on the 8th and 22d, respectively, but the hour at which they were seen and the peculiarities of the displays were not given.

THUNDER-STORMS.

Thunder-storms are reported to have occurred in the various districts on the following dates:

New England.—2d, 3d, 5th, 6th, 8th to 11th, 14th to 17th, 19th, 20th, 22d to 25th, 27th.

Middle Atlantic states.—1st, 2d, 4th to 10th, 12th to 15th, 17th to 21st, 23d to 28th.

South Atlantic states.—2d, 3d, 5th to 9th, 11th to 16th, 18th, 19th, 20th, 22d to 29th.

Florida peninsula.—5th, 6th, 8th, 10th, 14th to 23d, 25th to 28th.

Eastern Gulf states.—2d, 4th, 5th, 8th, 14th, 16th to 27th, 29th.

Western Gulf states.—1st to 5th, 7th, 12th to 22d, 24th, 26th, 27th, 29th, 30th, 31st.

Rio Grande valley.—2d to 7th, 13th to 17th, 19th to 23d, 25th to 28th.

Tennessee.—2d to 6th, 10th to 14th, 19th, 21st to 27th.

Ohio valley.—1st, 3d to 7th, 9th to 13th, 15th, 18th, 19th, 22d, 23d, 26th, 27th, 28th.

Lower lake region.—1st to 6th, 9th, 10th, 11th, 13th, 15th, 16th, 18th, 19th, 22d, 23d, 26th, 27th.

Upper lake region.—1st, 4th to 13th, 15th, 18th, 22d to 26th.

Extreme northwest.—4th, 9th, 10th, 17th, 21st, 27th, 30th.

Upper Mississippi valley.—1st, 2d, 4th to 13th, 17th to 23d, 25th, 31st.

Missouri valley.—1st to 5th, 9th, 11th, 12th, 13th, 15th to 27th, 29th, 30th, 31st.

Northern slope.—4th, 6th, 10th, 11th, 12th, 15th, 16th, 18th, 19th, 20th, 23d, 25th to 30th.

Middle slope.—1st, 4th, 10th to 17th, 19th to 31st.

Southern slope.—1st, 2d, 6th, 7th, 12th, 14th to 21st, 24th to 28th, 30th.

Southern plateau.—1st, 2d, 15th, 17th to 21st, 25th, 26th, 27th, 29th, 30th, 31st.

Middle plateau.—3d, 8th to 11th, 13th, 14th, 15th, 17th, 19th, 20th, 21st, 23d to 26th, 29th.

Northern plateau.—8th, 9th, 13th, 14th, 15th, 24th, 25th, 31st.

North Pacific coast region.—3d, 8th to 11th, 13th, 24th, 25th.

Middle Pacific coast region.—8th, 10th, 16th to 19th, 30th, 31st.

South Pacific coast region.—San Diego, California, 14th, 17th; Cahuenga, California, 15th, 17th.

The following are some of the most important instances of damage by lightning which have occurred during the month.

Dover, Strafford county, New Hampshire: during a violent thunder-storm on the morning of the 9th, several buildings were struck by lightning and burned, entailing a total loss of $21,000. Numerous instances of damage by lightning were also reported from various points in New England on the above date.

Fort Worth, Texas: at 2 a. m. of the 21st the cupola on the telephone exchange building was struck by lightning. One hundred and fifty wires connected with the switchboard were melted and the switchboard was ruined.

Philadelphia, Pennsylvania: on the night of the 23–24th, a large oil tank at the Atlantic refinery in the southwestern part of the city was struck by lightning and set on fire. The flames spread rapidly to the other tanks in that vicinity and on the morning of the 24th thirty tanks of oil were burning. The losses resulting from this conflagration are estimated at $280,000.

Cleveland, Ohio: during a violent thunder-storm on the night of the 23–24th, two tanks of petroleum were struck by lightning and set on fire; loss, $30,000.

Brownsville, Texas: considerable damage was done to the telephone exchange by lightning on the 27th.

ATMOSPHERIC ELECTRICITY INTERRUPTING TELEGRAPHIC COMMUNICATION.

Rio Grande City, Texas, 2d.
Ashland, Oregon, 11th.
Fort Macon, North Carolina, 14th, 26th.
Fort Assinaboine, Montana, 16th, 26th, 27th.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various districts on the following dates:

New England.—4th, 6th, 7th, 19th, 21st, 22d, 26th, 27th.

Middle Atlantic states.—2d to 5th, 10th, 13th, 15th, 16th, 19th, 24th, 25th.

South Atlantic states.—3d, 4th, 5th, 7th, 8th, 15th, 18th, 21st, 22d, 27th, 28th, 29th, 31st.

Florida peninsula.—18th, 29th.

Eastern Gulf states.—1st, 3d, 4th, 14th, 15th, 20th, 22d, 25th.

Western Gulf states.—2d, 6th, 12th, 14th, 16th, 17th, 19th, 20th, 21st, 23d, 25th, 26th, 28th, 30th, 31st.

Tennessee.—1st, 2d, 4th, 14th, 15th, 20th, 22d, 23d, 24th, 26th, 29th, 30th.

Ohio valley.—1st, 5th, 17th, 18th, 20th.

Lower lake region.—2d, 5th, 10th, 11th, 14th to 17th, 23d, 25th, 27th.

Upper lake region.—1st, 3d, 11th, 16th, 17th, 18th, 25th, 26th, 29th, 31st.

Upper Mississippi valley.—3d, 5th, 11th, 15th, 17th, 21st, 30th.

Missouri valley.—6th, 14th, 17th, 19th, 24th, 28th, 30th.

Middle slope.—2d, 4th, 7th, 13th to 18th, 21st, 23d.

Southern plateau.—10th, 30th.

Middle plateau.—10th, 13th, 28th.

Northern plateau.—2d, 4th, 13th, 15th.

North Pacific coast region.—2d, 7th, 11th, 12th, 28th, 29th, 30th.

Middle Pacific coast region.—1st to 5th, 9th, 11th, 12th, 14th to 17th, 24th, 28th.

South Pacific coast region.—3d, 9th, 16th, 21st.

Captain R. B. Quick, commanding the s. s. "Lone Star," reported: "16th, noon, off Alligator Light-house, (N. 24° 50′, W. 80° 30′), observed very brilliant solar halo; the circle was about 20° in diameter and was more perfect and brighter than any rainbow."

LUNAR HALOS.

Lunar halos have been observed in the various districts on the following dates:

New England.—1st, 4th 5th, 6th, 8th, 10th.

Middle Atlantic states.—1st to 5th.

South Atlantic states.—2d, 3d, 4th, 6th, 7th, 8th, 28th, 31st.

Eastern Gulf states.—1st, 4th, 5th, 7th, 29th.

Western Gulf states.—4th, 6th, 8th to 11th, 15th, 29th, 30th, 31st.

Tennessee.—2d, 3d, 4th, 12th, 13th.
Ohio valley.—2d to 5th, 8th, 10th, 11th, 12th, 21st.
Lower lake region.—3d, 5th.
Upper lake region.—1st, 2d, 3d, 5th, 9th.
Upper Mississippi valley.—1st, 2d, 4th, 5th, 7th, 8th, 15th, 31st.
Missouri valley.—2d to 6th, 8th, 31st.
Northern slope.—29th.
Middle slope.—2d, 5th, 23d, 29th, 31st.
Southern plateau.—3d, 9th.
Middle plateau.—1st, 2d, 4th, 5th, 15th, 31st.
Northern plateau.—1st, 4th.
North Pacific coast region.—1st, 7th, 10th.
Middle Pacific coast region.—2d, 3d.

MIRAGE.

Milwaukee, Wisconsin: from 4 to 5 p. m. of the 29th, Racine Point, twenty miles south on Lake Michigan, was plainly visible on the horizon.

Mirages were also reported from the following stations:
Duluth, Minnesota, 9th.
Galveston, Texas, 10th.
Webster, Dakota, 15th.
College City, California, 20th, 21st.
Kitty Hawk, North California, 23d.
Indianola, Texas, 28th.

MISCELLANEOUS PHENOMENA.

The Signal Service observer at Bismarck, Dakota, reports that at 9 p. m., on the 22d, and again at noon of the 23d, several sharp reports, compared to that of a small pistol, caused by the striking of small fragments of stone against the windows, were generally heard throughout the city. The phenomenon was the source of general comment, the cause of it being unknown until the afternoon of the 23d, when numerous pieces of a flinty substance, supposed to have been of meteoric origin, were collected.

The following note in reference to this phenomenon appeared in one of the Bismarck newspapers of May 23:

> For several days the people of the city of Bismarck have been wondering what it was that caused the cracking noise against the windows of the stores and houses. * * * * By close observance it was ascertained that the substance which occasionally struck against the glass was a meteoric stone. Small pieces were picked up last evening and were found to be fine fragments of stone. * * * * * * * * *

Observers along the Atlantic coast from Rhode Island to New Jersey, report that on the evening of the 2d, the moon appeared to be of a bright red color. This phenomenon was evidently caused by the smoke from the extensive forest fires which prevailed in New Jersey, New York and Pennsylvania for several days preceding that date.

The following stations report having observed the peculiar appearance of the moon above referred to:

Point Judith, Rhode Island: the atmosphere was filled with smoke from 7.30 to 11.30 p. m. of the 2d, during which time the moon appeared to be of a dull red color.

Narragansett Pier, Rhode Island: from 8 to 11.30 p. m., on the 3d (?), during the prevalence of a light haze, the moon appeared to be of a bright red color.

Philadelphia, Pennsylvania: at about 7 p. m. of the 2d, a dense smoke filled the atmosphere through which the moon appeared to be of a blood-red color.

Barnegat City, New Jersey: on the afternoon of the 2d, the atmosphere was filled with a dense smoke, and at night the moon was of a deep orange color.

SUNSETS.

The characteristics of the sky as indicative of fair or foul weather for the succeeding twenty-four hours have been observed at all Signal Service stations. Reports from one hundred and fifty-nine stations show 4,864 observations to have been made, of which three were reported doubtful; of the remainder, 4,861, there were 4,069, or 83.7 per cent., followed by the expected weather.

SUN SPOTS.

Professor David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for May, 1884:

Date—May, 1884.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 5 p. m...	0	0	1	10‡	0	0	3	70‡	
2, 11 a. m...	1	2	0	5‡	0	0	4	60‡	
3, 7 a. m...	1	3	1	5‡	.....	.....	4	45‡	
0 p. m...	0	0	1	2	0	0	3	35‡	
5, 8 p. m...	1	3	1	5	1	3	3	20	
9, 7 a. m...	3	30‡	0	0	.....	.....	6	55‡	
11, 3 p. m...	2	5‡	0	0	2	5‡	8	60‡	
12, 11 a. m...	0	10‡	0	3	0	0	8	65‡	
14, 12 m.....	1	3	0	0	1	3	8	50‡	
15, 10 a. m...	1	2	0	10‡	1	2	8	40‡	One of the spots very large.
16, 10 a. m...	0	0	1	10‡	0	0	6	25‡	
17, 6 p. m...	1	3	1	5‡	1	3	6	20‡	
18, 10 a. m...	1	1	0	0	1	1	7	25‡	
19, 11 a. m...	0	0	1	2	0	0	6	25‡	Two of the spots quite large
20, 3 p. m...	0	0	1	1	0	0	5	25‡	Four of the spots quite l'ge
21, 1 p. m...	1	2	0	5‡	0	0	6	20‡	
22, 11 a. m...	3	10‡	2	2	3	5	7	30‡	
23, 3 p. m...	3	20‡	0	0	2	10‡	10	50‡	
24, 11 a. m...	0	0	0	0	0	0	10	50‡	
25, 3 p. m...	0	0	0	0	0	0	10	45‡	
26, 11 a. m...	1	10‡	0	0	0	0	11	55‡	
27, 10 a. m...	0	20‡	2	10‡	0	0	9	65‡	
29, 9 a. m...	1	1	1	3	1	1	7	60‡	
30, 5 p. m...	2	5‡	0	0	2	5‡	9	60‡	
31, 12 m.....	0	0	1	2	0	0	8	50‡	

Faculæ were seen at the time of every observation. ‡Approximated.

New Haven, Connecticut: at 5 p. m. on the 2d, during the prevalence of a dense haze, the sun was of a dark red color, and on its disc was observed a large spot, resembling the "transit of Venus."

Yuma, Arizona: at 6 p. m. of the 14th a large spot was observed on the sun. A light sand storm was prevailing at that time, and through the sand in the air the spot was distinctly seen. The same spot was also seen on the 3d, appearing like the shadow of a planet; it was apparently moving across the sun from east to west, describing an arc of circle. On the 16th the diameter of the spot was about one-thirtieth that of the sun; on the 17th it was nearing the lower edge of the sun; it was visible on the 18th and 19th, but was not observed after the last named date.

EARTHQUAKES.

The following extract is taken from "The New York Maritime Register," of May 21, 1884.

> On April 21st, when in N. 21° 06′, W. 61° 43′, the schooner "M. A. Nutter" was shaken from stem to stern by the shock of an earthquake, apparently from the westward.

The following is taken from the "New York Herald" of May 15th.

> CONSTANTINOPLE, *May* 14, 1884.—An earthquake has occurred in the region south of the sea of Marmora. Some damage was done at Panderma and Erdek, in the province of Broussa. Two slight shocks were felt at Balikesr, but no damage was caused.

METEORS.

Captain L. J. Stevens, of the schooner "John Bracewell," reported: May 4th, 2.10 a. m., local time, in N. 42° 28′, W. 70° 00′, saw a very bright meteor, altitude 45°, bearing ne., course about wnw., ending at nw., altitude about 30°.

Dayton, Washington Territory: at 9.15 p. m. of the 13th, an unusually bright meteor was seen passing in a southerly direction. At its disappearance two bright flashes, occurring in rapid succession, were observed; it left a pale white cloud which floated off in a southerly direction. At 1 a. m. on the 16th, a brilliant meteor passed from near the zenith to the horizon; when about midway between those points it exploded into three parts, all of which disappeared beneath the horizon.

Meteors were also observed at the following places:
Somerville, New Jersey, 1st.
Swanwick, Illinois, 3d.
Prairie du Chien, Wisconsin, 7th, 27th.
Red Willow, Nebraska, 9th.
Milan, Tennessee, 9th.

Liberty Hill, Lousiana, 13th.
Fort Scott, Kansas, 13th, 21st.
Woodstock, Maryland, 15th, 24th.
Davenport, Iowa, 17th, 19th, 21st.
Manhattan, Kansas, 18th.
Bethel, Connecticut, 23d.
Lead Hill, Arkansas, 27th.
Beloit, Wisconsin, 27th.

PRAIRIE AND FOREST FIRES.

Elkton, Cecil county, Maryland: the high winds on the 3d caused the forest fires, which had been burning in this vicinity for several days, to spread rapidly. Several thousand acres of valuable timber land were burned over; fencing and buildings were destroyed.

Washington, Warren county, New Jersey: an extensive fire prevailed in the Blue mountains, about twenty-five miles distant, on the 2d and 3d, and dense clouds of smoke swept over this county. On the afternoon of the 2d this town was enveloped in a suffocating smoke.

Port Jervis, New York: the entire village of Gilman's Depot, in Sullivan county, was burned on the afternoon of the 2d, the fires originating in neighboring forests. It is reported that not more than half a dozen houses were left standing within a radius of five miles in that vicinity; two railroad bridges were also burned. The total loss is estimated at $100,000.

Kingston, Ulster county, New York: forest fires burned a large quantity of timber in the Catskills on the 3d.

New York City: the atmosphere was filled with smoke on the 3d, caused by the forest fires in the surrounding country. Reports from Middletown, Orange county, on the above date, stated that the Catskill mountains and those north of Shawangunk township, in Ulster county, were on fire. Fires were also burning on Storm King mountain near Cornwall, and in the highlands west of Haverstraw.

On the 25th, forest fires burned over a large tract of land between Setauket and Stonybrook, Long Island.

Petersburg, Virginia: reports from Isle of Wight county on the 3d, stated that destructive forest fires were burning in that county on the above date.

Mount Carmel, Northumberland county, Pennsylvania: much fencing and cordwood were destroyed by the forest fires on the 3d. The fires, which burned over an area of many square miles, are considered the most destructive that have occurred here within the last fifty years.

Reading, Berks county, Pennsylvania: fires prevailed in the Blue mountains along the northern border of this county on the 3d, destroying much valuable timber.

Scranton, Lackawanna county, Pennsylvania: the branch works of the Moosic powder works were destroyed by forest fires on the afternoon of the 1st, resulting in a loss of $20,000. In one of the buildings destroyed was stored a large quantity of powder and the explosion caused the destruction of the adjoining buildings. At Tobyhanna, Monroe county, the fires burned with great energy, threatening many dwellings and vast timber interests.

Ashland, Schuylkill county, Pennsylvania: great damage was done to forests in this county by the extensive fires which prevailed on the 3d. In Northumberland county the fires destroyed more than 5,000 cords of charcoal and also ignited the Culmbank coal mine at Hill Gap. Reports from Emporium, Cameron county, on the 3d, stated that the forest fires had destroyed a large amount of property. At Sterling run, nine miles from Emporium, several buildings, including a large mill, were burned; at Swissmont, fifteen miles west of Emporium, two mills with a large amount of lumber were destroyed.

Wilkes Barre, Luzerne county, Pennsylvania: forest fires prevailed in this vicinity during the 1st, 2d, and 3d. At California, a lumbering town near White Haven, eleven houses were consumed. Two bridges on the Beaver Creek branch of the Lehigh Valley railroad, together with a large amount of valuable timber, were also destroyed. The total loss is estimated at $50,000.

Wellsborough, Tioga county, Pennsylvania: the forest fires in this county, on the 1st, 2d, and 3d, destroyed about one hundred dwellings, together with much valuable timber, entailing a total loss of about $600,000.

Prairie and forest fires were also reported by the following stations:

Vermilion, Dakota: prairie fires were observed almost daily during the month and noticed every night from 25th to 31st.
Fort Buford, Dakota: 7th, 16th, 19th, 23d, 24th, 25th.
Yankton, Dakota: 7th, 8th, 13th, 14th, 15th, 17th, 18th.
Poplar River, Montana: 9th.
Milton and Rowe, Massachusetts: 4th.
Taunton, Massachusetts: 5th.
Troy, Pennsylvania: 1st.
State College, Pennsylvania, 2d.
Providence, Rhode Island: 2d.

WATER SPOUTS.

The "Oswego Palladium" of May 30th publishes the following:

Many residents of Pultneyville, Wayne county, on Lake Ontario, who were looking out upon the lake about 6 o'clock last Thursday (22d?) evening were treated to the sight of an unusual occurrence. It will be remembered that at that time a strong wind was blowing and a slight rain was falling in this section. T. Scott Ledyard, who was looking out upon the lake at the time and was one of the spectators of the scene, states that the sight was one of the most remarkable he has ever witnessed. About five miles from the shore a huge body of water from thirty to forty feet high and over two miles in breadth was seen advancing toward the shore with great rapidity. It grew larger as it advanced, and a deep trough or road was produced by the rising water. Above the great wave was mist, which entirely cut off the view from behind, and made the spectacle grand and impressive to the beholder. Mr. Ledyard states that this great wave moved to within three to four miles of the shore, and had risen to its greatest proportions, when it suddenly subsided; the roar died away, the mist above parted, and soon the heavens were comparatively clear again. He states that those who were fortunate enough to witness this very rare, although terrifying sight, agree that it was one never to be forgotten.—*Lyons Rep.*

The brig "Noord Ster" on May 3d, when in N. 21° 53′, W. 55° 37′, was struck amidships by a large water spout, which carried away the maintopmast staysail. Charleston, South Carolina: at 7.30 a. m. of the 27th, a water spout was seen off James' island shore; it was apparently seventy-five feet in height; it disappeared when near the "hundred pines."

MIGRATION OF BIRDS.

Geese flying northward.—Vermilion, Dakota, 3d, 6th; Dudley, Massachusetts, 10th; Clear Creek, Nebraska, 2d; Grand Haven, Michigan, 7th; Albany, Oregon, 21st.

The following extract is taken from the "Saint Paul Pioneer Press" of May 24, 1884:

WINONA, MINN., *May* 23.—On Tuesday (20th) and Wednesday (21st) nights of this week thousands of migratory birds gathered about the electric light on the standpipe in this city. Between the hours of 1 and 2 o'clock the birds were seen in swarms about the light, and more than one hundred fell to the ground. A few were caught alive, but the larger part were dead. Professor Holzinger, of the Normal school, reports the following species among those collected during the past two nights, through the kind offices of Engineers Bothman and Higgins at the waterworks, viz: Catbirds, grossbeaks in variety, scarlet tanagers, golden-crowned thrushes, water thrushes, chestnut-sided warblers, blackburnian warblers, Tennessee warblers, magnolia warblers, Carolina rails, yellow-throated virees, black and white creepers, Trael's fly-catchers, green-crested fly-catchers, Savannah sparrows, white-throated sparrows, Maryland yellow throats, black-billed cuckoos, hell-drivers, indigo birds, and yellow-bellied woodpeckers. On Tuesday night the grossbeaks predominated and on Wednesday night the rails. Catbirds were numerous on both nights. The birds which breed in this locality were noticeably absent. Valuable additions from these birds are being made to the museum of the Society of Arts and Science, and a set of duplicates of most of the varieties has been furnished by Professor Holzinger to the High school collection. Many of the birds which were caught alive may be seen in cages at the engine house of the water-works.

POLAR BANDS.

Lead Hill, Arkansas, 1st, 5th, 26th.
Archer, Florida, 1st, 8th, 12th, 13th, 17th.
Riley, Illinois, 16th, 20th.

Maud, Kansas, 22d.
Gardiner, Maine, 6th, 7th, 22d.
Vineland, New Jersey, 9th, 12th, 26th.
Wauseon, Ohio, 1st, 5th, 6th, 16th, 21st, 30th.
Nashville, Tennessee, 30th.
El Paso, Texas, 24th.
Wytheville, Virginia, 2d, 8th, 15th.
Lynchburg, Virginia, 20th.
Cape Henry, Virginia, 15th.
Yates Centre, Kansas, 20th.

ZODIACAL LIGHT.

Archer, Florida, 13th, 22d.
Humboldt, Iowa, 10th, 26th.
Cambridge, Massachusetts, 12th, 14th.
Escanaba, Michigan, 11th.
Nashville, Tennessee, 15th, 16th, 17th, 19th, 20th.

DROUGHT.

Havana, Mason county, Illinois, 30th: the crops in this vicinity are suffering in consequence of drought.

Milledgeville, Baldwin county, Georgia, 31st: crops are beginning to suffer from lack of rain.

INSECTS.

Professor C. G. Boerner, of Vevay, Switzerland county, Indiana, reports that during May, "insects injurious to vegetation, prevailed to an alarming extent, currants, gooseberries, roses, and grapevines, suffering especially from their ravages."

SAND STORMS.

Fort Thomas, Arizona, 2d.
Yuma, Arizona, 13th, 14th, 18th, 25th.
Fort McDowell, Arizona, 8th.

NOTES AND EXTRACTS.

REPORT OF THE OHIO METEOROLOGICAL BUREAU, MAY, 1884.

The means of the barometer readings, taken at the several stations during the month, show nothing unusual in the matter of atmospheric pressure. On the whole the pressure was slightly lower than for May, 1883, and the range was also somewhat less. The mean temperature for the month was 60°.7, which differs by only three-tenths of one degree from what may be considered the normal mean for May, although it is nearly three degrees higher than the mean for last year. The highest point reached during the month was 90°, at Waverly on the 22d, which is one degree higher than the maximum for May of last year. The minimum was also higher, and the range was almost exactly the same. The maximum daily range of temperature was not as great this year as last. The number of "clear days" was greater, and altogether the weather was more nearly "fair."

The mean rainfall was very nearly "normal," being 3.87 inches, while for May of last year it was 5.72 inches.

Tornadoes are reported from Licking county, Fayette county, and Morgan county. The latter appears to have been somewhat destructive at McConnellsville, where it is reported as having unroofed several houses, blown down many trees, etc. Considerable damage was done at a point two or three miles northeast of the town, where many large trees were blown down. The path of the tornado was not over one hundred feet wide, and it came from the wsw. Frost is reported from the same county on the 29th and 30th, doing but little damage, however.

A violent hail-storm is reported at Marietta on the 13th. The belt through which the storm passed was narrow, but the hail-stones were of unusual size, and in some cases the damage was considerable.

A self-registering anemometer has recently been put in operation at the central office at the Ohio State University. It has been running since 8.15 a. m., May 16. From that date to the end of the month, 3,861.5 miles of wind were recorded, being at the rate of 246 miles per day, or a little more than ten miles per hour. The maximum in one day was 402 miles, from noon of May 22 to noon of the 23d. The minimum was 161 miles, from noon of the 24th to noon of the 25th.

STATE SUMMARY OF REPORTS FOR MAY.

Mean barometer, 29.957 inches.
Highest barometer, 30.376 inches on the 29th at Wauseon.
Lowest barometer, 29.517 inches on the 19th at Toledo.
Range of barometer, .859 inch.
Mean relative humidity, 72.7 per cent.
Mean temperature, 60°.4.
Highest temperature, 90°.0 on the 22d at Waverly.
Lowest temperature, 28°.5 on the 29th at Junction.
Range of temperature, 61°.5.
Mean daily range of temperature, 22°.2.
Greatest daily range of temperature, 42°.0 on the 22d at Ironton.
Least daily range of temperature, 5°.1 on the 27th at Cincinnati.
Number of clear days, 10.7.
Number of fair days, 11.4.
Number of cloudy days, 8.9.
Number of days on which rain fell, 13.0.
Mean rainfall, 3.87 inches.
Average daily rainfall, .125 inch.
Greatest rainfall, 6.27 inches at Sidney.
Least rainfall, 1.76 inches at Warren.

T. C. MENDENHALL, *Director.*

The following extracts are taken from the May report of the "Tennessee Weather Service," under direction of Hon. A. J. McWhirter, Commissioner of Agriculture:

The meteorological conditions of May were characterized by generally low temperature about the 15th, with heavy rain storms and severe electrical disturbances at intervals during the month.

The mean temperature for the month was 66°.42, or 10°.85 above that of April and 1°.92 above that of May, 1883. The mean maximum temperature was 86°, which was 2° above the mean of May, 1883; and the mean minimum was 48°, or 8° above the mean of May, 1883.

The average precipitation for the month was 3.58 inches, 1.37 inches less than that of April, and .29 inch less than the average for May, 1883. The days of the greatest rainfall were the 2d, 3d, 4th, 5th, 13th, 22d, and 25th. The greatest fall occurred on the 4th, the average for that day being .684 inch; the next greatest was on the day following, the average being .436 inch. These rains in the early part of the month were reported very heavy in the western division of the state, and were quite destructive to the young crops, also damaging the lands to a great extent by washing out of soil.

* * * * *

STATE SUMMARY.

Mean temperature, 66°.42.
Highest temperature, 90°, on the 22d, at Hurricane Switch.
Lowest temperature, 39°, on the 31st, at Kingston Springs.
Range of temperature, 51°.
Greatest daily range of temperature, 41°, on the 31st, at Kingston Springs.
Least daily range of temperature, 1°, on the 8th, at Greenville; on the 25th, at Beech Grove; and on the 26th, at Alexandria.
Mean depth of rainfall, 3.58 inches.
Mean daily rainfall, .115 inch.
Greatest depth of rainfall, 8.64 inches, at Trenton.
Least depth of rainfall, 1.09 inches, at Waverly.
Average number of clear days, 10.3.
Average number of fair days, 11.2.
Average number of cloudy days, 9.5.
Average number of days on which rain fell, 7.3.
Prevailing direction of wind, southwest.

REPORT OF THE ALABAMA WEATHER SERVICE, UNDER DIRECTION OF PROFESSOR P. H. MELL, JR.

AGRICULTURAL AND MECHANICAL COLLEGE,
AUBURN, ALABAMA, *June, 1st*, 1884.

The reputation for droughts earned by May in past years has in no respect been lost by the month just closed. The atmosphere has been dry and vegetation has suffered. Only three stations report over three inches of rain and four report a fall of less than one inch. The average rainfall for the state falls below two inches.

From the 1st to the 5th it was warm with very light showers. The wind during this time was generally from the southwest. From the 5th to the 18th a cool wave passed over the state with the wind blowing from the west and northwest. After the 18th, and until the 25th, there was an increase in the temperature, with the wind from the south and southwest; and the remainder of the month the wind veered around to the north and northeast, with falling temperature.

Although the month has been dry and parching, yet the thrifty farmers of the state have taken advantage of such conditions of the atmosphere to clean out their crops thoroughly and prepare them to receive profitably the refreshing rains of June.

The observers generally report no phenomena of special interest. From Trinity the following data have been received: "There have been no storms during this month. Very little rain has fallen, though it was cloudy with light showers. The weather has been remarkably cool for the season, and vegetation is very backward. Crops are at least one month late. The dry, cool weather during the latter portions of the month has injured oats, and perhaps cut off that crop almost entirely in this section. Not more than one-half inch of rain has fallen during this month at this point. Fruit prospects are good."

The observer at Tuscumbia reports the weather so cool the 14th, and again during the last week of the month, that fires were comfortable.

SUMMARY.

Mean temperature, 74°.3.
Highest temperature, 98° at Calera on the 22d.
Lowest temperature, 41° at Birmingham on the 30th.
Range of temperature, 57°.

Greatest monthly range of temperature, 55° at Birmingham.

Least monthly range of temperature, 26° at Tuscaloosa and at Greensborough.

Greatest daily range of temperature, 43° at Birmingham on the 30th, 43° at Calera on the 21st, 42° at Selma on the 18th.

Least daily range of temperature, 1° at Tuscaloosa, 1° at Union Springs, 2° at Greenville, 2° at Greene Springs—all on the 5th.

Mean depth of rainfall, 1.77 inches.

Mean daily rainfall, .056 inch.

Greatest depth of monthly rainfall, 3.83 inches, at Newton.

Least depth of monthly rainfall, 0 42 inch at Birmingham.

Greatest daily rainfall, average for the state, 0.45 inch on the 5th.

Heaviest daily rainfall, 2.00 inches at Newton on the 5th.

Days of general rainfall, 5th, 24th, 25th, 26th.

Average number of days on which rain fell, 7.

Average number of cloudy days, 8.

Average number of clear days, 8.

Average number of fair days, 15.

Warmest days, 22d, 23d.

Coldest days, 10th, 30th.

Prevailing direction of wind, southwest.

REPORT OF THE MISSOURI WEATHER SERVICE, MAY, 1884.

The mean temperature during the past month was, at the Central Station, 64°.7, which is 1°.6 below the normal for May.

The maximum temperatures were on the 9th and 10th of the month almost all over the state. From the 10th to the end of the month a very even temperature, ranging around 70° at the Central Station, was noticeable, with a comparatively even daily range.

The lower minima were generally observed on the first and last days of the month.

The rainfall at the Central Station was but little over one-half the normal amount for Saint Louis, which is 4.72 inches. The largest amounts of rainfall were observed at stations in the upper Missouri river valley; the smallest amounts at Phelps City, in the extreme northwestern part of the state, and at Pleasant Hill and Harrisonville, in the central western part.

Large flakes of snow were observed on the 1st at Oregon.

Hail was observed on the 12th at Saint Louis.

The month has been remarkable for the prevailing cloudiness with a comparative deficiency of rain.

FRANCIS E. NIPHER, *Director.*

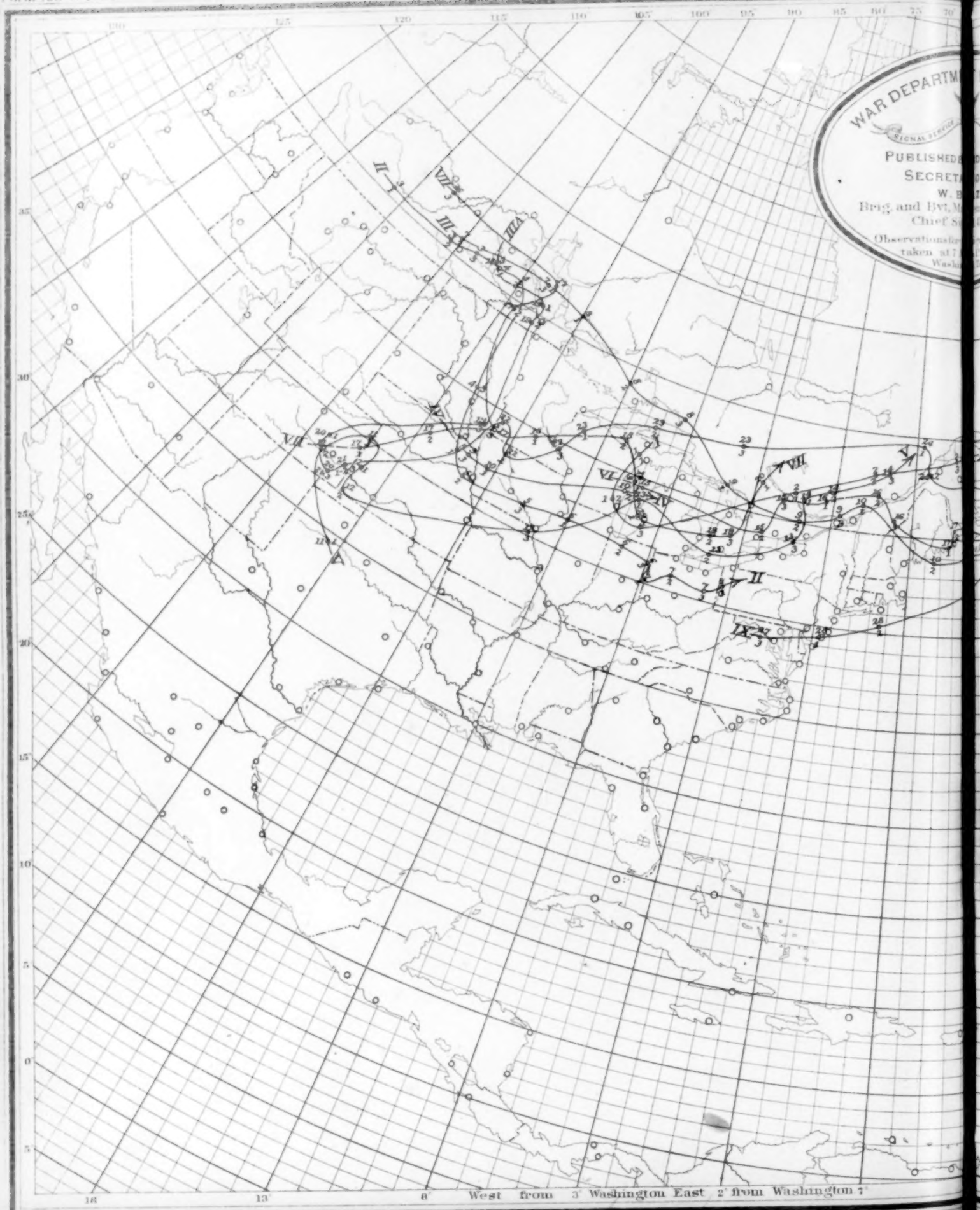
WASHINGTON UNIVERSITY, *June* 7, 1884.

The following meteorological summary is taken from the May report of the Illinois Department of Agriculture, Mr. S. D. Fisher, Secretary:

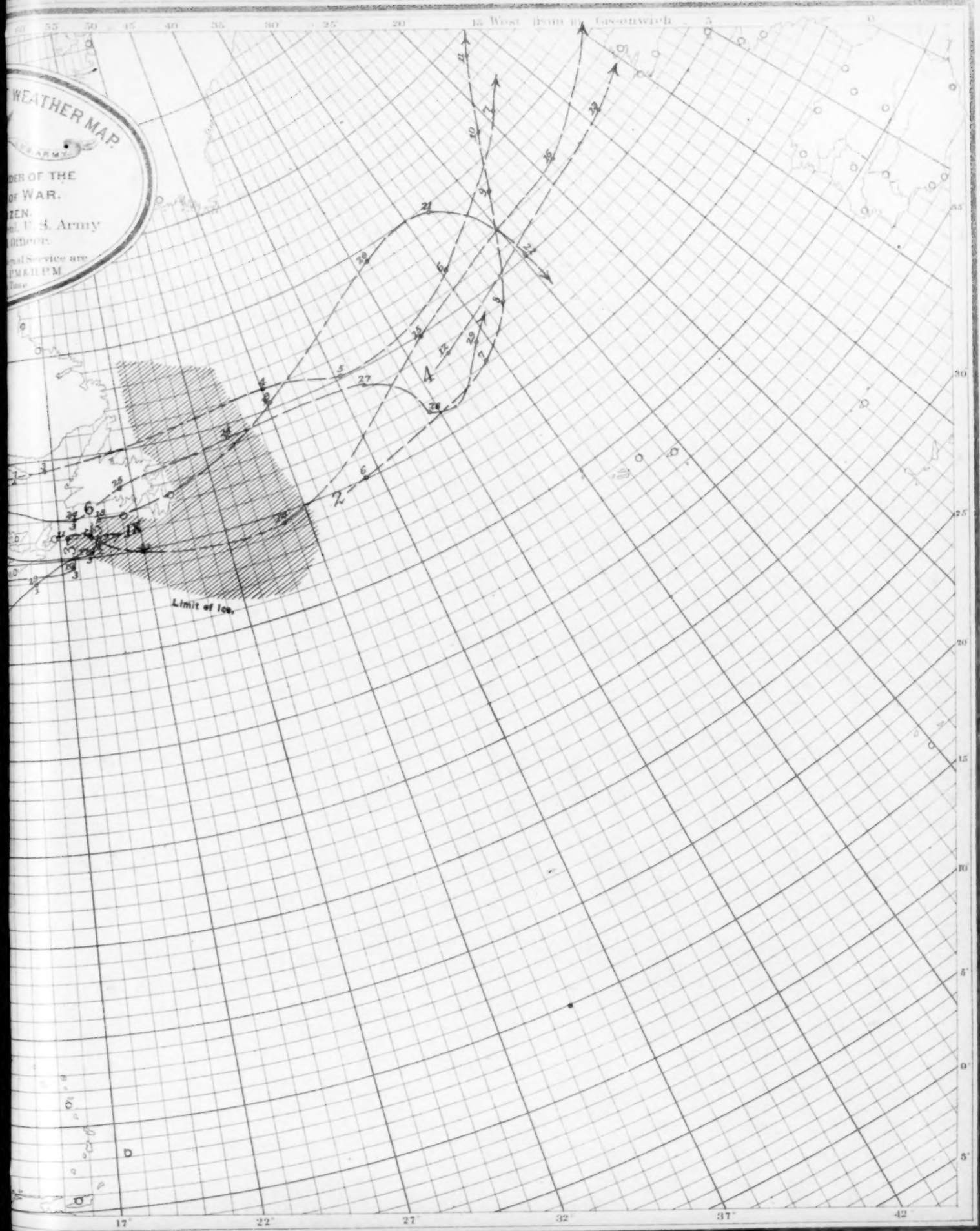
Districts.	Mean temperature.	Precipitation.
	°	*Inches.*
Averages for northern counties	59.55	3.38
Averages for central counties	60.91	4.39
Averages for southern counties	64.34	5.04
Averages for state	61.60	4.27

Form 106 C 1884

Chart I. Tracks of Low-Ba



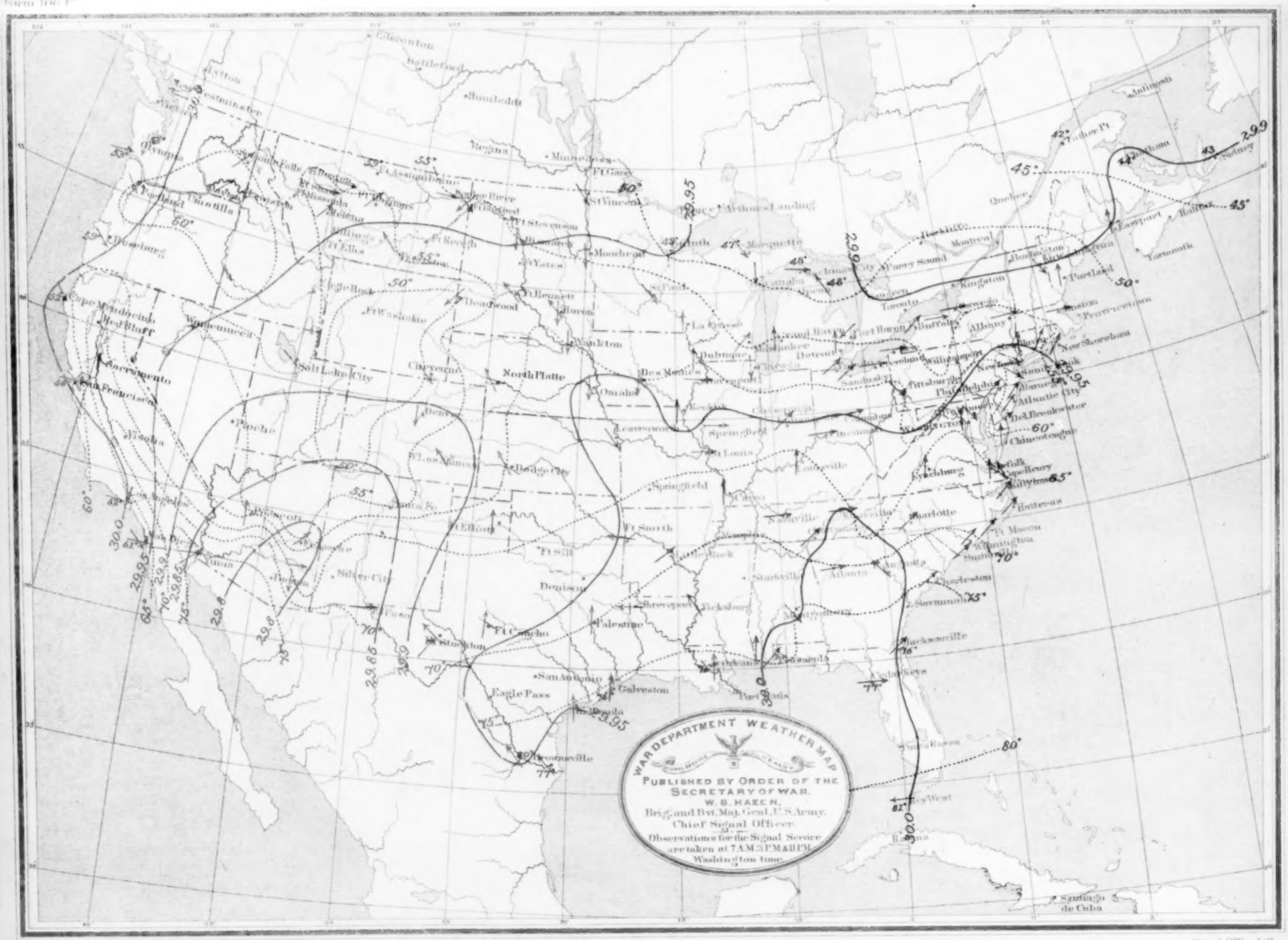
meter Areas, May, 1884.



Charles H. Isobert's Instructions and Wants. May 1884

Form 106 F

Chart II. Isobars, Isotherms, and Winds. May, 1884.


WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
W. B. HAZEN,
Brig. and Bvt. Maj. Genl. U.S. Army.
Chief Signal Officer.
Observations for the Signal Service are taken at 7 A.M. 3 P.M. & 11 P.M. Washington time.
Edmonton
Battleford
Bismarck
Moorhead
Yankton
Omaha
North Platte
Cheyenne
Salt Lake City
Sacramento
San Francisco
Portland
Walla Walla
Olympia
Duluth
Marquette
Toronto
Montreal
Quebec
Portland
Eastport
Halifax
Sydney
Boston
New York
Philadelphia
Washington
Atlantic City
Old Fleetwater
Chincoteague
Hatteras
Wilmington
Charleston
Savannah
Jacksonville
Key West
Havana
Santiago de Cuba
Vicksburg
Shreveport
Galveston
Indianola
Brownsville
Eagle Pass
San Antonio
Palestine
Dodge City
Denver
Omaha
Chicago
Detroit
Cleveland
Buffalo
Albany
Pittsburgh
Cincinnati
Louisville
Nashville
Atlanta
Memphis
St Louis
Leavenworth
Springfield
Fort Smith
Fort Sill
Fort Elliott
Fort Bascom
Fort Wingate
Santa Fe
Silver City
Tucson
Yuma
Los Angeles
Fresno
Stockton
Red Bluff
Cape Mendocino
Roseburg
Walla Walla
Spokane Falls
Fort Assiniboine
Fort Custer
Fort Maginnis
Fort Shaw
Helena
Fort Keogh
Fort Buford
Fort Yates
Fort Stevenson
Fort Totten
Fort Ransom
Fort Abercrombie
Fort Wadsworth
Fort Sisseton
Fort Pembina
Fort Garry
Winnipeg
Battleford
Edmonton
Qu'Appelle
Prince Arthurs Landing
Parry Sound
Kingston
Ottawa
Port Huron
Grand Haven
Milwaukee
Fort Huron
Escanaba
La Crosse
Dubuque
Des Moines
Davenport
Keokuk
Fort Riley
Fort Dodge
Fort Reno
Fort Supply
Fort Elliott
Fort Concho
Fort Clark
Fort Brown
Fort Davis
Fort Bayard
Fort Lowell
Fort Whipple
Fort Klamath
Fort Boise
Fort Lapwai
Fort Walla Walla
Fort Spokane
Fort Colville
Fort Simcoe
Fort Townsend
Fort Canby
Fort Stevens
Fort Klamath
Fort Bidwell
Fort Gaston
Fort Humboldt
Fort Bragg
Fort Ross
Fort Point
Fort Mason
Fort Monroe
Fort Hamilton
Fort Niagara
Fort Columbus
Fort Wood
Fort Hancock
Fort Adams
Fort Trumbull
Fort Constitution
Fort Preble
Fort Sullivan
Fort Popham
Fort Sullivan
Fort Point
Fort Gorges
Fort Constitution
Fort Stark
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Form 106 F.

Chart III. Precipitation, May, 1884.

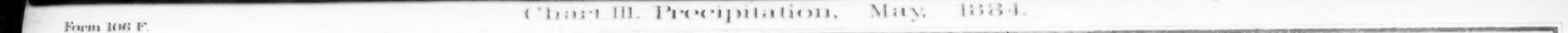

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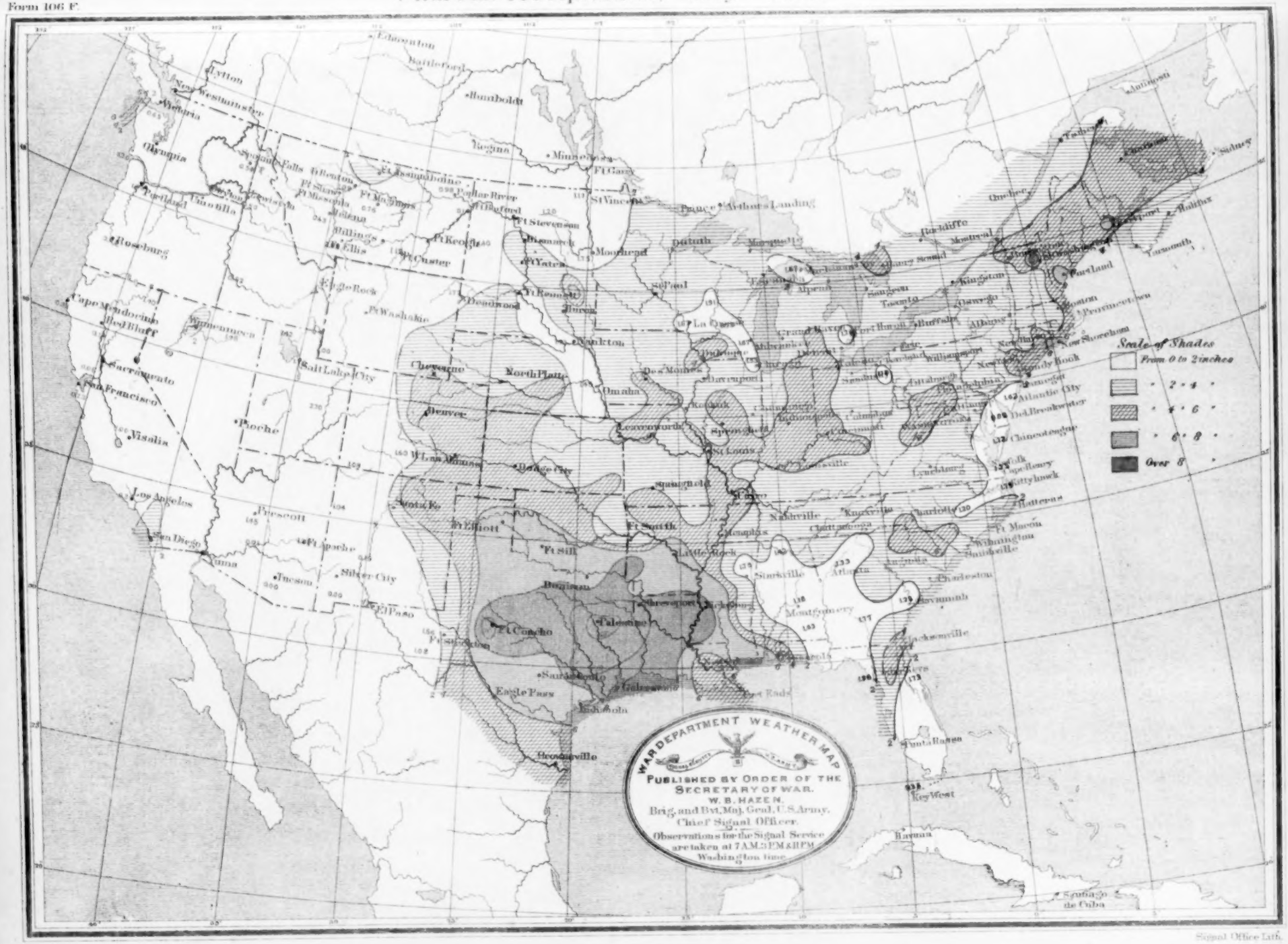
Chart III. Precipitation, May, 1884.


Scale of Shades
From 0 to 2 inches
" 2 " 4 "
" 4 " 6 "
" 6 " 8 "
Over 8 "
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Signal Office Lith.